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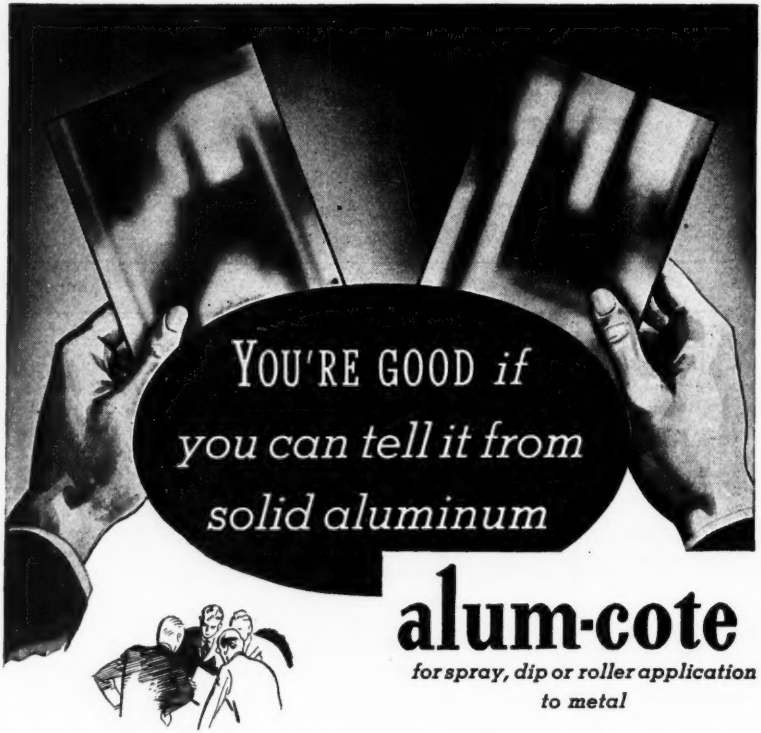

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Products finishing

Cincinnati, Ohio Vol. 2, No. 11

August, 1938

Cleaning and Electroplating Zinc Alloy Die Castings

By E. C. Rinker

Research Laboratories, Oakite Products, Inc., New York, N. Y.

THE electroplating of zinc and zinc alloy die castings presents unique problems to the plater. This is due principally to the chemical and physical properties of the zinc and its die cast alloys.

On finishing die castings, it must be kept in mind that the finish previous to cleaning and plating has a great bearing on the final appearance and durability of the casting. In many cases the finishing, other than removal of the fins and gates, requires only buffing on a rag wheel. Whenever possible, it is better to use this method because the cutting down will be so slight as not to penetrate the outer skin of the die casting which is less porous than the casting as a whole. This advantage will be self explanatory.

Where the finish cannot be acquired with this operation, polishing must be resorted to. This operation consists of polishing on a wheel, which consists of a felt or canvas wheel on the surface of which is glued 100 to 400 mesh abrasive. If the article is to be given a heavy deposit and then buffed, it is occasionally practical to eliminate buffing after the polishing operation.

Chemically Clean Work Must Be Produced

The next and most important step is the cleaning of these castings. Unless the articles are plain and free from crevices and pockets where there would be an accumulation of polishing and buffing compounds, it is best to remove most of this dirt, previous to immersion in a properly selected alkaline cleaning solution which will leave the work in the necessary chemically clean condition. This may be done in three ways:

1. Use of solvent degreasers.
2. Use of the Oakite Saturol Process (patented).
3. Wiping with rag by hand.

The solvent degreaser removes the grease and some types of dirt, but invariably leaves a film of zinc oxide despite a vapor rinsing. It is, of course, always necessary to follow with a final alkaline cleaning bath of a type designed to make the work ready for the acid dip preceding plating. In this method, baskets are used if the plating racks are coated with a rubber coating as many of these coatings are attached by the trichlorethylene.

The use of the Oakite Saturol Process provides for the articles being immersed in the liquid and then spray rinsed before alkaline cleaning. This method permits not only complete removal of grease, but greater and sometimes complete removal of dirt. Many of the commercial materials used for rack coatings are not affected by the Oakite Saturol, and in these cases, the work may be racked before entering the Oakite Saturol solution, an important advantage in many production set-ups. Utilizing a cold solution, the Oakite Saturol Process eliminates the need of heat at this step. Less fumes are produced, and are non-toxic in nature.

The use of rags for wiping may be used but quite often the costs are prohibitive especially in mass production.

Proper Selection of Cleaning Material Important

For the alkaline bath, care must be taken in making a choice of the cleaning material to be used. It must possess properties which will enable it to rinse freely and completely from the work. The material should be one that does not attack die castings as do strong alkalies and cyanides which leave colored films and alkaline zinc salts. Films of this nature interfere with the adhesion of the electroplate.

The cleaner is used electrolytically. The temperature of the solution, the concentration of the cleaning compound and the time have a great bearing on the final results. The work is used as the cathode at 6 volts, with current sufficient to cause vigorous action.

Removable steel anodes are used as a rule because there will be a scale formation on the anode which is easier

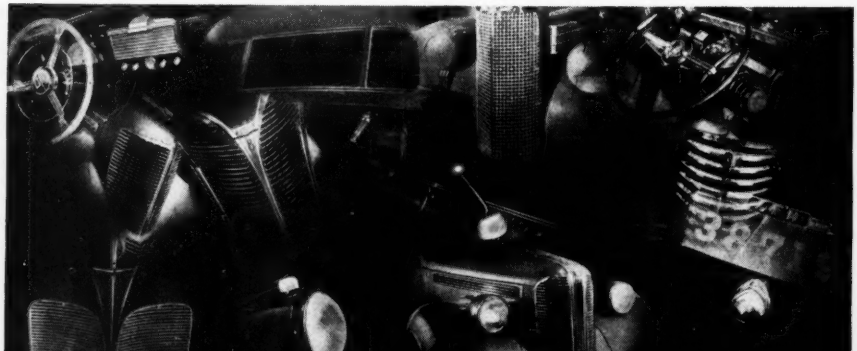

Fig. 1—A photo-montage showing zinc alloy die castings on 1938 model automobiles. Just a few of the things you will find are a steering wheel hub, remote shifting unit, window frame, radiator grilles, headlamp brackets, license plates holders.

to remove when accumulation is such as to prevent good conductivity.

Sometimes a hot rinse is used, followed by a cold rinse. Despite these precautions, alkaline solutions and small particles of dirt and zinc salts will penetrate the pores and must be removed. This is done by an immersion for a few seconds in a weak acid solution. The acid solution not only neutralizes any remaining alkali but provides a slight etch which seems to help adhesion of the plate.

Various acid dips are used, namely: hydrochloric, hydrofluoric and sulphuric. They vary from 1 to 10 per cent according to individual shops. A few seconds is sufficient as there is a tendency to produce a mat finish and a discoloration of the work. The work should be removed as soon as gas bubbles form on it.

A thorough rinsing in cold water is essential to remove all the acid as it may interfere with the plating solution.

For subsequent plating deposits, the use to which the articles are put regulates the thickness of the deposit. If the articles are exposed to weather, a thickness of from .00075 in. to .001 in. thickness and never less than .0005 in. is necessary. For mild indoor use, about .0003 in. is desirable.

If the article is to be given a nickel plate it should be plated directly unless a heavy copper deposit is used underneath.

A flash copper cyanide deposit should not be resorted to because copper will diffuse into the zinc thus causing trouble and breakdown when exposed to the weather. With the heavy copper deposit all the copper will not be absorbed in the normal lifetime of the article. For deposits of from .0003 in. to .0005 in. nickel direct is preferred.

Where heavier deposits are required, they may be done by nickel direct, copper nickel or nickel copper nickel.

Copper deposits from .00025 in. to .0003 in. do not necessarily have to be buffed prior to nickel plating.

The preferred copper bath for zinc

Fig. 2—Bicycles, too, are up on styling and appearance. Here is a plated zinc die cast alloy part of a bicycle headlamp.

die castings has the following:

Copper	3-3.5 oz./gal.
Free Cyanide	.5-.75 oz./gal.
Carbonates	up to 5 oz./gal.
Temp.	100 deg.-110 deg. F.
	10-15 amps./sq. ft.

Proper maintenance of the above solution is necessary for successful operation. From 15 to 20 minutes gives approximately .0003 in. copper. In some shops, a cyanide copper is followed by an acid copper plate.

After the copper deposit, the work may be rinsed and transferred directly to the nickel bath. It is not necessary to prepare a special nickel bath when the articles are given a heavy copper plate.

When zinc or zinc die castings are to be plated direct with nickel, the type of solution is quite different from the ordinary nickel solution.

Due to the relative position of zinc and nickel in the electromotive series,

we know that if a piece of zinc is immersed in a solution containing a nickel salt, which in a plating solution is ionized, the zinc will displace the nickel and the nickel will form a sur-

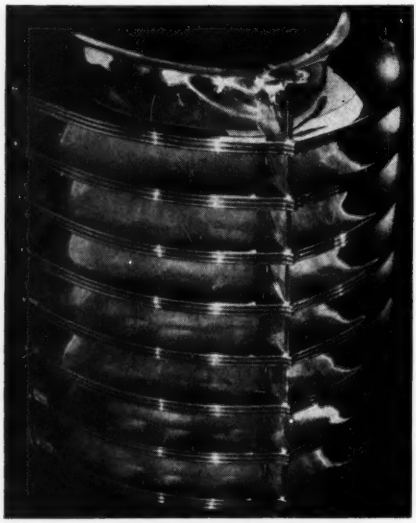

Fig. 3—A 1938 zinc alloy die cast automobile radiator grille. This type of grille reached a new high in popularity this year.

face layer on the zinc or die casting. This deposit, unfortunately, is non-adherent, thus causing trouble.

In order to overcome this condition in a nickel plating solution, the nickel content is reduced and in this way the nickel ions are lowered. To this solution is added a sulphate ion, namely sodium sulphate. By doing this it discourages, to some extent, deposit by immersion.

A typical bath for zinc die castings is:

Nickel sulphate	10 oz./gal.
Anhydrous sodium sulphate	10-25 oz./gal.
Ammonium chloride	3 oz./gal.
Boric acid	2 oz./gal.

Tem. 70-80 deg. F. C.D. 10-20 amps./sq. ft.

pH 5.8-6.2 colorimetric

The sodium sulphate content should be regulated according to the articles to be plated. Plain pieces with no recesses require less sulphate content than those with deep recesses or complicated shapes. In general, the less sodium sulphate used to secure uniform deposits the better. The increase of the sulphate content increases the tendency to burn the deposit on exposed edges; therefore lowering the maximum current density of this bath. Current should be applied to the work as it goes in the bath. Work should never be left in the nickel bath without current.

A thickness of .0003 in. can be obtained in a bath of this kind in about 30 minutes at 12 amperes per square foot. This bath must be maintained with the same care as other solutions and it has somewhat the same problems in pitting, porosity, contamination, etc., and these problems are corrected in the same manner. There are several specially prepared proprietary baths on the market that are used with good results.

In plating copper-nickel deposits to a total of .001 in., the article is given a .0002 in. deposit in solution described above and then plated in an acid copper to .0004 in. copper, color buffed and cleaned. It is then plated in any regular warm nickel bath to .0004 in.

Zinc may be plated directly with black nickel and the deposit is adherent.

Chromium is usually plated over a nickel deposit, but chromium can be plated directly on zinc. The deposit is usually milky or frosty. Buffing the milky deposit gives a good luster.

Cadmium plating directly on zinc die castings is resorted to in order to give a better appearance. Buffing the castings is not resorted to in this case.

It is understood that the success of

any plating operation depends not only on proper selection of cleaning and plating materials and equipment, but also upon an experienced plating department personnel to see that the exacting methods needed are consistently followed.

(Photos Courtesy New Jersey Zinc Co.)

Haveg Bulletin 0-1. Haveg Corporation, Newark, Del., is now offering Bulletin 0-1 describing corrosion resistant chemical equipment. The material used in the manufacturing of the corrosion resistant chemical equipment is designated as Haveg "41". Haveg 41 is a molded construction material produced from a mixture of a special acid-washed asbestos and a synthetic resin of the phenol-formaldehyde type. Both of these ingredients are highly corrosion resistant, so that the corrosion resistance of the finished Haveg is not merely a surface condition but exists throughout the entire mass of the material.

Haveg 41 is produced by loading the carefully mixed ingredients into molds and subjecting them to heat and pressure. In this manner, tanks can be produced as large as 9 ft. in diameter by 9 ft. in depth in one piece, or even larger by bolting sections together.

Haveg 41 is not a molding powder or molding composition for use by the molding industry. It is a finished material, fabricated in the Haveg plant, and available in the form of complete units of equipment or parts molded to shape. Illustrated in the bulletin are many pieces of equipment which have been constructed with Haveg 41. A copy of Bulletin 0-1 will be sent free upon request.

"Kill Foam At Its Source." This is the title of a 4-page folder in which "Foamex," a foam reducing compound recently developed by Glyco Products Company, Inc., 148 Lafayette St., New York, N. Y., is described. Foamex is said to prevent excessive foaming and speeds up production by the prevention of air holes and the elimination of "false body." Foamex is economical to use, since as little as 1 ounce to 10 gallons is sufficient to reduce foam in most cases. Where the foam produced is not too stubborn, much less Foamex is required. Foamex is said to give excellent results in practically all cases where it is used.

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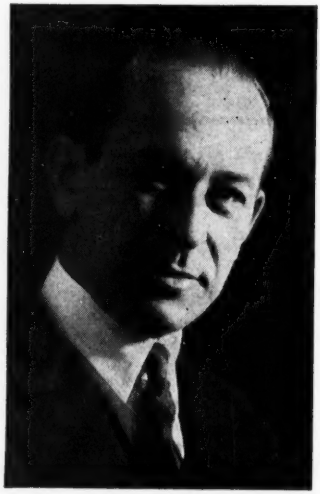
Barrel Finishing of Metal Products

Part Three of Sixteenth Article of Series — Factors in the barrel finishing of silver and silver plated wares — Types of Barrels and operating technique.

By H. Leroy Beaver

THE matter of contract barrel burnishing of table silverware by plating establishments, for hotels, restaurants, clubs, cafeterias and institutions, as a maintenance proposition, has brought forth more comment than we had anticipated. The principal questions have been, in substance:

1. What kind of burnishing equipment would it be necessary for us to install?
2. Could we adapt our present equipment to this maintenance work?
3. How would we go about establishing such a service — what are the advantages to the customer, and what effect will continual burnishing have on the silverware?



H. Leroy Beaver

There are a number of makes and sizes of Silver Burnishing machines now on the market, most anyone of which would be applicable to silver maintenance work. These machines are widely known in the food service field due to the fact that their manufacturers have carried out an extensive sales campaign to interest operators of hotels, restaurants, cafeterias, hospitals and institutions in the importance of barrel burnishing for both cleanliness and resistance to wear.

The first Silver Burnishing Machine developed and sold in this country was the Tahara which is manufactured by The Rochester Engineering & Centrifugal Corporation, a Division of American Laundry Machinery Company, 110 Buffalo Road, Rochester, N. Y. The size of these machines and their capacities were covered by the description in Part One of this inter-series which appeared in the May Issue of Products Finishing, to which the reader is referred. Of the smaller size, and which we believe would be most applicable for maintenance work, there is the 8 inches in diameter by 12 inches long and the 8

inches in diameter by 24 inches long. These two are primarily intended for flatware, but they will also very satisfactorily finish small hollow ware items. There are also three combination units wherein a single motor is used to drive a small barrel for flatware and also a larger barrel to accommodate large hollow ware pieces. These units or combinations as they are called, are 8x12 in combination with 17x12; 8x24 in combination with 17x24, and 8x24 in combination with 17x36, but the 17x24 and 17x36 may also be purchased as single units, these, of course, being intended for the larger pieces such as trays, meat dish covers and on up to wine tubs and such is the nature of their flexibility that a customer's requirements may be easily estimated and then various combinations of equipment can be made up and installed to not only provide for present day needs but also for probable later expansion. In common with the general line of products of this Company, Tahara Machines are made from the highest grade of materials and show uncommonly fine workmanship, and while they are the pioneer silver burnishers, they have been consistently improved and they enjoy the widest popularity of any of the equipment for silver maintenance in the food service field.

Fig. 1—Tahara Silver Burnishing Machine for Flatware Burnishing

We are glad to be able through the courtesy of the Company to illustrate two of these machines in connection with this series. The first is the 8x24 model flatware machine shown in Figure 1.

The second is typical of the style of the 17x12; 17x24 and 17x36 in single units, and these are the types of barrels used on the larger pieces of

hollow ware as previously noted. The capacities of this type of barrel as shown in Fig. 2 have already been given.

The second Silver Burnishing Machine in point of development was the Sterling, a product of Josiah Anstice & Company, Inc., Rochester, N. Y. Sterling Burnishers are made in a range of ten sizes, as follows, the first figure indicating the diameter of the barrel, the second the length of the barrel, 8x12; 8x24; 9½x20; 9¼x12; 12x24; 20x17; 20x33; 20x27 and 20x39. It is quite unlikely that any plating establishment would require much in the way of large size barrel equipment for we have found that as a general rule a hotel, club or institution that uses in their food service such articles as meat dish covers, toast covers, double portion coffee pots, soup tureens, water pitchers or serving trays, is generally able financially to install its own burnishing equipment. So that irrespective of the make of barrel, we would deem what we term the smaller sizes intended principally for flatware and small hollow ware, such as from 6½x11 to 9½x20 to meet the major portion of the requirements for barrels for maintenance service. The Sterling machines present a number of interesting features as for instance in the smaller units for flatware they have what we might term a semi-automatic separator, whereby with a half turn of the barrel, the parts being burnished are left on a screen through which the burnishing material drops back into the barrel, and then the screen is simply lifted out and plunged into either the small rinsing tank cast integral with the pan of the machine or else plunged into a rinsing tank, which undoubtedly saves considerable time, and then again, the lids of their larger barrels are all counterbalanced to provide for greater ease in opening and closing. Like the Tahara Machines, the Sterling Burnishers are made from high quality materials and are all that might be desired in the way of well balanced design. We had hoped to be able to present illustrations of at least two of the Sterling Machines, but the electroplates for these illustrations have not been received. Josiah Anstice have prepared a very interesting set of bulletins covering their machines and we feel sure they would be glad to supply these to interested parties who would request them at the address as above given.

The next machine in the development of Silver Burnishing is the Silverbright, which is a product of Fred C. Good & Sons, 4th Street & Sedgeley Avenue, Philadelphia, Pa. Silverbright Burnishers were designed to supply the field of smaller requirement and they market two sizes of machines, the "A" having a barrel 6¼ in diameter by 11½ long and "B" 8 inches in diameter and 12 inches long. Here we come to an entirely different type of barrel. Both the Tahara and Sterling Machines just described utilize about one third of their barrel area as a lid which runs the entire length of the barrel, whereas the Silverbright Machine is of the "end opening" variety similar to the commercial burnishing barrels of Baird, LaSalco, Crown, Belke, and so on. The barrels are so constructed that they can quickly and easily be raised from the horizontal or operating to the vertical or loading position. They are very simple to operate, and they differ from other types in that when a load of work is completed both the silverware and the steel burnishing materials are poured from the barrel into a double unloading pan the inner member of which has a screen bottom, and this inner pan can be readily lifted when the burnishing material drops through the screen leaving the burnished silverware in the inner pan which can be used as a rinsing pan. A second charge

of silverware is then placed in the barrel, the burnishing material poured in from the outer pan, and the very simple lid can be quickly replaced, the barrel dropped to its horizontal position and again be put into operation. These machines are small in appearance as compared with other types and it is almost unbelievable the quantities of work that can be put through them in the course of the day's operation. Being of the end loading variety they can be loaded to greater capacity than the one-third lid opening barrels. This is a worm driven machine and the ratio is such that both models are readily and easily operated with a 1/6 h.p. motor. Another feature of this machine is the fact that it is easily portable. The Model "A" is what we might term a bench type of machine as it is mounted on a short legged table, and is so light in weight that it may be carried about from one place to another. The Model "B" is a larger unit and this is mounted on a steel table with rubber wheel casters to enable the operator to wheel it about and when not in use it can be stored in any out of the way place.

Neither of the Silverbright Machines require permanent drain or electric current connections, because the power line may be plugged into any convenient outlet. The table of their capacities will be noted later in this paper. A barrel of this type does not function so well in burnishing hollow ware as it is more difficult to load than the one-third lid opening types, which can be fitted with separators to prevent lateral displacement of the hollow ware while the barrel is in opera-

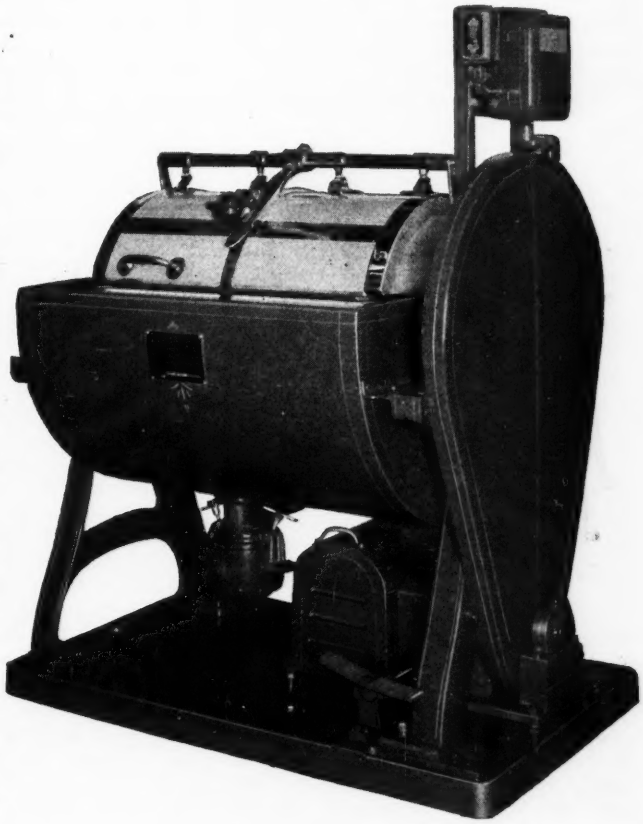


Fig. 2—Tahara Silver Burnishing Machine for Hollow Ware Burnishing

tion. With care however, they do function very well on the smaller hollow ware parts. The loadings of burnishing material for these two barrels is 32 pounds for the "A" and 62 pounds for the "B", which is closely equivalent to the loading used in both Tahara and Sterling machines of approximately equal size.

In connection with the foregoing description we illustrate one of the Model "B" Silverbright Burnishing Machines in Fig. 3.

Fig. 3—Silverbright Model "B" Silver Burnishing Machine

The three types of machines just described are the most widely known in the food service field, they have all been on the market for some years and are quite generally known through the activities of the sales divisions of their manufacturers.

In addition to these, there is now in course of development by Munning & Munning, 202-208 Emmett Street, Newark, N. J. an entirely different type of Silver Burnishing Machine, which will be produced in what we might term a multiple barrel variety. Since the start of this inter-series on silver burnishing, we are informed by the manufacturers of this machine that they now have in course of development a machine having two barrels, one for flatware and one for hollow ware, both driven by one motor but capable of being operated independently of each other. The barrel for flatware will have the conventional single panel opening while the barrel for hollow ware will be of the typical one-third lid variety. The barrels of this machine will be made of rock maple with cast bronze end plates, as distinguished from the all bronze castings of the three previously described barrels. The hollow ware barrel will be provided with separator plates to prevent lateral displacement of the parts when the barrel is in operation. We are able to illustrate herewith in Fig. 4 a six barrel unit of the type described, and the silver burnishing machine will be constructed from two of these units.

It will be noted that in the three machines hereinbefore described, that barrels for flatware are confined in their diameter within a range of from 6½ inches to 9½ inches. The Munning & Munning barrel marks a very sharp departure from this principle for both the barrel for the flatware and the barrel for the hollow ware are of the same dimension, that is, 12 inches wide and fourteen inches in diameter, which places this machine just about midway in capacity between the flatware barrels and the hollow ware barrels of the Tahara and Sterling types, but it does provide a machine that will take at least two pieces of hollow ware per load of a dimension up to 12 in. overall. On this size of barrel the contemplated speeds of 18 r.p.m. for the hollow ware barrel and 24 r.p.m. for the flatware barrel should enable this machine to function very satisfactorily, and due to the fact that the barrels are driven with one small motor from a rack drive, that the barrels can be instantly removed from the driving rack, coupled with

the extreme simplicity of the machine would indicate that it will be a very valuable addition to the silver burnishing service in the food service field. The loading and unloading features are interesting as well because they utilize the double tray method modeled somewhat after the method of unloading commercial burnishing barrels. We are quite in accord with Munning & Munning in their getting away from what is considered conventional practice to introduce something new and entirely practical that will have a larger capacity for handling pieces over a wider size range.

As between burnishing barrels made of some metal and lined with maple and barrels of cast bronze with a smoothly finished inner surface, we have heard much controversy. One school of thought argues that silver should not be burnished in a barrel where there is a metal to metal contact, but that a wood liner is imperative, while another claims that there is no difference, and we have been asked to clarify this situation.

In the beginning of silver burnishing the barrels of the Tahara Machine were made of wood, the staves being about 2½ inches in thickness. They were held together with metal hoops, and the shafts were on spiders bolted to the ends of the barrels. Following this, the wood barrels were lined with light weight sheet copper, and finally the barrels were made of cast bronze. This type of barrel is now indicative of Tahara, Sterling and Silverbright Machines. Down through the years, commercial burnishing barrels have been made principally from cast iron, and this shell, when used in the barrel burnishing, especially of plated parts, is invariably lined with maple, the reason for this being a double one, first because all cast iron contains free

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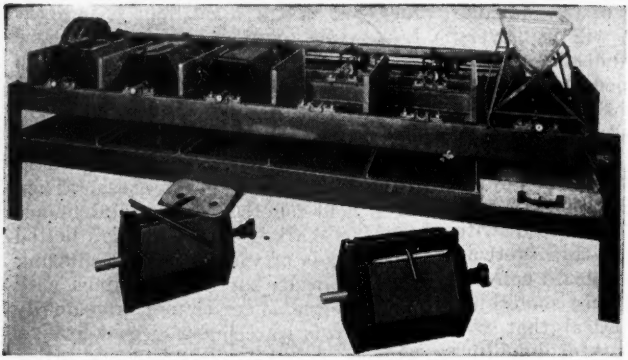


Fig. 4—Munning & Munning Multiple Barrel Burnishing Machine

graphitic carbon, and because iron when wet will oxidize and the rust will stain work in process, and secondly because commercial burnishing barrels are operated at much greater speeds than barrels used in silver burnishing, which we might illustrate by saying that an 8x24 commercial burnishing barrel will operate up to 60 r.p.m. while the same size barrel when used in silver burnishing on flatware will average around 28 r.p.m. A barrel of 16x24 dimensions when used commercially operates at around 24 r.p.m. and the same barrel when used on silver ware would be operated at a maximum of 15 to 18 r.p.m. We cannot override the original concept of Jean Uebersax in his development of the original Tahara Silver Burnishing Machine, because this concept was simply that by regulating the control of the speed of the barrel, that the parts to be burnished would remain centrally suspended in the burnishing mass, and if so be it, through the action of the resultant force within the mass, a part did come into contact with the side of the barrel no damage would result, and the part would almost immediately find its way back to its central position. It must be remembered too that in burnishing hollow ware what we would term "bulk" loading is not practiced, and as we have previously stated, barrels for hollow ware are provided with separators to prevent lateral displacement of the parts being burnished. While this is not true in just the same sense when it relates to the burnishing of flatware, knives, forks and spoons, the speeds at which the flatware barrels are operated precludes any thought of injury to the parts. We have never in all the years of our experience in silver burnishing heard a single complaint of damage to silverware from operating it in a cast bronze barrel. It is not to be assumed however, that this applies to silverware that would be operated in a cast iron barrel, because here we would have an entirely different problem, and we cannot subscribe to the use of cast aluminum, not because it would damage the silver, but because it is too liable to be attacked by the alkaline content of the soap used as a lubricant in the burnishing process.

In addition to the machines previously described, there are two others on the market, one the Lupomatic Silver Burnishing Machine, a product of the Lupomatic Machine Company of 4510 Bullard Avenue, New York City, and the other known as the Kraeft Silver Burnisher, manufactured by Paul P. Kraeft, Jersey City, N. J. We are not sufficiently familiar with either of these machines to attempt a detailed description other than to say that they are of the conventional type, the Lupomatic being reduction gear driven, and the Kraeft

a friction driven machine, and both are rated as giving very satisfactory service. Detailed descriptions of these machines, and indeed of all the machines described, will be gladly supplied by their manufacturers on your request.

We have been asked to discuss the capacity per load and the operating time for silver burnishing barrels, and we give this information for flatware type barrels in Table 1.

The per hour capacity of any burnishing barrels naturally depends solely on the condition of the silverware itself.

If only a ten minute run is required, the capacity will naturally be twice as great as if a twenty minute run is required. We, however, would recommend as least twenty minute runs on all maintenance work. Forks should be operated alone, knives also alone, but spoons may be mixed as between large and small sizes.

Steel steak knives with silver handles cannot be satisfactorily barrel burnished. The operation of the machine will roll over and round the edge of the steel blade.

The lids of coffee and tea pots should be tied open by passing a string around the projecting knob on top of the lid, thence around the upper curve of the handle. This enables the burnishing material to work into and out of the pot and burnish the inner as well as outer surface, and also prevents damage to the lids.

The proper loading of steel burnishing material mixture whether all round balls, balls and pins, or a mixture of Balcones, Finbals, Diagonals and Diamonstels for flatware barrels is as follows:

6¼x11½ 32 lbs.; 8x12 62 lbs.; 8x24 124 lbs.

These quantities will fill the respective barrels two-thirds full of burnishing materials alone, without parts, and are recognized as the proper loading ratios.

Now as to the question of whether a plater's present equipment might be adapted to this class of silver maintenance work, we would say yes,

Barrel Size	Capacity per charge Lid Opening Type Size		Capacity per charge End Opening Type Size	
Spoons	8x12	8x24	6¼x11½	8x12
Small	60	120	100	300
Large	40	80	80	160
Forks				
Small	50	100	80	160
Large	40	80	60	120
Knives				
Small	50	100	60	150
Large	40	80	50	100
Coffee & Tea Pots				
Small	1	3	4	6
Sugar Bowls	2	4	4	6
Butter Chips	50	100	100	200
Iced Tea or Soda Spoons			90	175
Oyster Forks			200	400

TABLE 1

so far as it relates to barrels of the end opening type, such as Baird, LaSalco, Belke or Crown, but in case such equipment is to be used, the wood liner must be tightly fitted and intact, and the barrel must not have previously been operated with an abrasive of any character. There

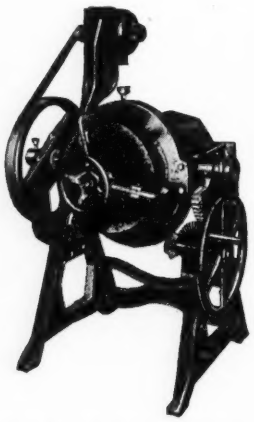


Fig. 5—LaSalco Single Burnishing Machine

must also be a material change in the operating speed of the barrel from that used for commercial barrel burnishing. For small hollow ware a division rack must be made that will hold four articles such as coffee pots, to prevent lateral displacement while in operation, and no part should be placed in the barrel unless its greatest over-all dimension is at least two inches less than the shortest distance across faces of the inside dimension of the barrel. When operating on hollow ware the speed should not exceed 18 r.p.m. and on flatware the speed should not exceed 32 r.p.m. The barrel should be kept level to prevent bunching of the work in either end, and an oscillating type barrel even though it be of the end opening variety positively cannot be used for this silver maintenance burnishing on either flat or hollow ware.

We are glad to be able, through the courtesy of the Baird Machine Company, Bridgeport, Conn., and the LaSalco Company, St. Louis, Mo., to illustrate two types of end opening barrels that may be adapted for use as above. We would point out however that the conventional commercial unloading arrangement cannot be used. The unloading pan should be elevated so that only a very slight tilt of the barrel is required to pour out the load and the parts may not be dropped from a height as is the case in much of the commercial barrel operations. The LaSalco Single Burnisher is illustrated in Fig. 5 and the Baird Single Burnisher is illustrated in Figure 6.

As in commercial burnishing, the burnishing mass, when not in use, must be kept fully covered with soapy water to prevent rust, because rust means pitting of the burnishing material and this would be fatal inasfar as it relates to satisfactory silver burnishing procedure.

The advantages to be pointed out to prospective customers by the plater are:

1. Hand polishing with abrasive polishes or creams wears away the silver plate, and will generally show a black smudge when wiped with a clean cloth.
2. By machine burnishing there is no deposit of any kind left on the silverware.
3. Barrel Burnishing irons out scratches and closes the pores in the surface so there is no place for dirt and grease to lodge.
4. Barrel Burnished silverware is the quickly outstanding evidence of clean restaurant service. Dull, greasy appearing silverware kills trade as well as suggests slovenly service.
5. Hand polishing only embraces the surface, especially of forks.

Barrel Burnishing cleans the areas between the tines as well as the exposed surfaces.

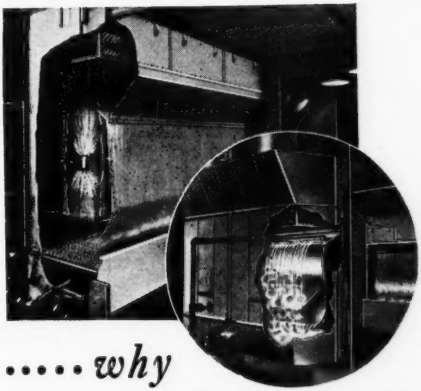
6. On hollow ware, hand burnishing only cleans the outer surface, barrel burnishing burnishes both inner and outer surface of the pot and the spout as well.
7. By work-hardening the plate silver lasts longer and there is less replating expense. (It has been estimated that the average life of silver in the food service field is six years, after which it should be stripped and replated). Thus time can be greatly extended by barrel burnishing as against hand polishing with abrasive materials.
8. Spotless silver adds to the attractiveness of the table, and establishes prestige for cleanliness. Bright attractive silver indicates cleanliness in the kitchen.

We believe that any average plater with a little extra effort will be able to bring in enough maintenance work to keep at least one 8x24 machine in almost continuous operation. Generally a demonstration of what the process will do on say ½ dozen knives, forks and spoons will be sufficient to convince any prospective customer and particularly so after the barrel burnished pieces are laid down alongside and compared with his silver before the burnishing process. The work, for the most part, must of necessity be performed in what we might term "off peak" hours.

The matter of barrel burnishing silver and silver plated wares has brought up several other questions, which it might be pertinent to answer here as a closing to the subject of silver burnishing generally. A question frequently asked is "Why do we always seem to be able to get a much brighter finish on our silver work than we get with other metals, such as copper or nickel? Is there

There are

CONVINCING REASONS



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any explanation for this?

Metals of course have their distinctive colors. Gold, when opaque, is of course yellow, but when hammered

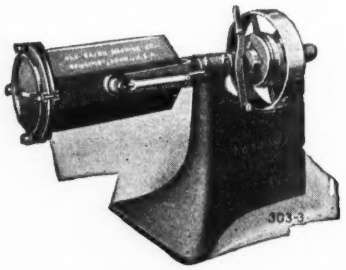


Fig. 6—Baird Single Burnishing Machine

down to a very thin film and this film held to the light, it shows a very decided green. Copper is red. Silver, tin and some few other metals are pure white, and silver even when beaten into a very thin film is absolutely opaque. As to the majority of all other metals, they have for the most part a grayish cast.

Now polished metallic surfaces, like the surface of other solids, divide any incident ray into two parts of which one is refracted while the other is reflected, with this difference however, that the former is completely absorbed and the latter, in regard to polarization is quite differently affected. An absolute 100 per cent would be the maximum of reflection value, and the following table of values expresses the percentage of incident light reflected. The superiority of silver is of course obvious:

Silver	90.6
Platinum	55.8
Nickel	58.5
Steel	58.6
Gold	36.8
Copper	48.8

During the course of these papers we have variously referred to the "ductility" of practically all electro deposited metals. Perhaps the thought we sought to convey would have been clearer and more easily understood had we said that these various metals had the quality of "plasticity", for this term would of course include the properties of "malleability" (capable of being flattened out under pressure without breach) and "ductility" (which in its most widely understood sense would imply capability of being drawn into wire). Silver, and some other metals such as pure iron and pure copper have this quality of plasticity and may be very easily drawn into wire, rolled into sheets or flattened under a hammer, but silver when subjected to such operations becomes harder after each operation and gradually loses to a very great extent its quality of plasticity. We mention this because we speak of a barrel burnishing operation as having a tendency to harden the plate and render it more resistant to wear. Hence the more often silver and silver plated wares are properly barrel burnished under pressure the less will be their plasticity and the greater their resistance to wear.

Of all the manufacturers of silver burnishing equipment we have corresponded with, they all without exception express interest in such a silver maintenance plan, and a desire to co-operate, so that readers of this series need not hesitate to write to any of the manufacturers mentioned for descriptive matter and further information respecting their equipment and its applicability to such a maintenance plan.

Parker Processes. Parker Rust-Proof Company, 2172 East Milwaukee Ave., Detroit, Mich., is now issuing a new booklet describing various applications of their unique processes of Parkerizing and Bonderizing, their rust preventative processes. This very attractive two-color booklet describes these two processes and cites many instances where they have solved the rust preventative problem.

Platers' Cleaning Compounds

The author explains in simple terms four important physicochemical principles involved in cleaning.

By Prof. E. K. Strachan
Brown University, Providence, R. I.

THE only test that will determine the worth of a cleaning compound is its performance when in use. This is due to the great variety of materials that must be cleaned, the various kinds of dirt that must be removed from them, as well as such considerations as time that can be spared for cleaning, the degree of cleanliness required, cleaning equipment available and so on. Anything that science can do to simplify the problem of cleaning is effort well spent.

It is the purpose of this article to set forth some of the different chemical and physical phenomena that are involved in the process of cleaning. At least four different physicochemical principles are involved in cleaning and in any particular problem one or the other of them may be most important or perhaps all four may be involved. A knowledge of these principles, what they are, how they operate and what they accomplish will minimize the time and effort required in the selection of the most suitable cleaner for any particular job.

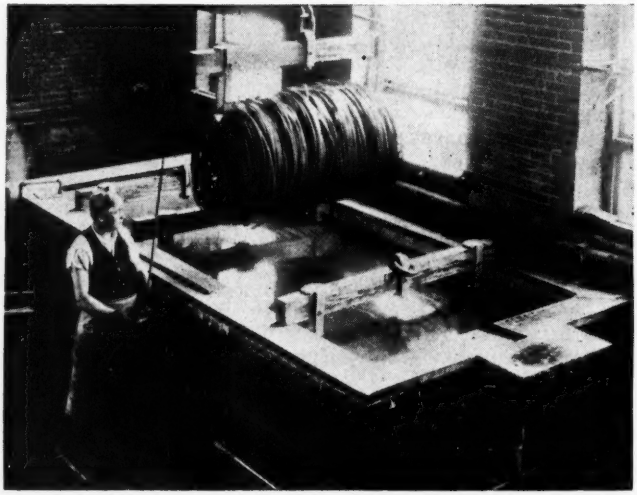
The first of these principles is saponification, which means soap making. The vegetable and animal oils and greases when brought in contact with caustic soda are converted to soap and glycerine. Mineral oils, lubricating oil, kerosene, and paraffin cannot be converted to soap and are, therefore, more difficult to remove from metal than are lard oil, stearic acid, and so on. The soaps made from the hard fats are less soluble in water than those made from the oils. Lard oil forms a soap that dissolves in cold water, while hot water is necessary to dissolve the soap formed from tallow. Many platers' cleaning problems could be considerably simplified by the use of saponifiable oils and greases in operations such as polishing, drawing, cutting, and so on. Even a moderate amount of saponifiable oil used with a mineral oil simplified cleaning.

The second principle involved in cleaning is emulsification or, in other words, the formation of an emulsion. An emulsion consists of fine droplets of one liquid suspended in another liquid. Ordinarily, oil and water will not mix, but if they are brought in contact with a suitable third substance and shaken, the oil will be broken into fine droplets which remain suspended in the liquid. The third substance that is added is called an emulsifying agent. The function of the emulsifying agent is to insert itself into the interface between the oil and water and form a sort of skin on the surface of the oil droplets. Because of a skin of this sort, the oil

droplets do not coalesce when they strike each other and form larger drops which would result finally in the oil and water separating into two layers. Alkalies in general, caustic soda or soda ash, are mild emulsifying agents; trisodium phosphate and sodium silicate are better; and best of all are the soaps, and particularly rosin soaps and their chemical modifications.

Wetting is the third principle involved in cleaning operations and indeed it is fundamental to all the other principles. Water will not wet oil. Indeed the slightest trace of grease on metal will cause water to break into drops so that the presence or absence of a water break on metal is an exceedingly delicate test of whether it is greasy or not. If a perfectly clean piece of metal is wetted with water and touched with the finger, there is usually enough oil on the finger to cause water to flow away from the spot that was touched. No piece of metal should be plated that shows a water break. This phenomenon of wetting, and many other properties of liquids, have their origin in surface tension. One can float a slightly greasy needle on a glass of water and observe the action of surface tension. The surface of the liquid acts as if it were covered with an invisible skin which holds the needle up. The surface is slightly bent downward by the weight of the needle. All liquid surfaces act to a greater or less extent, as if they possessed a skin.

The surface we commonly see is the surface between the liquid and air. There also exists a surface between the liquid and the container, or between the liquid and a piece of metal dropped into it, or even between immiscible liquids like oil and water. It is these latter surfaces that are of most importance in cleaning operations, that is, the surface between solids and liquids or between two liquids. If there is a strong surface between the liquid and solid, the liquid will not flow on the solid but tend to gather itself into a ball, as for example, a drop of water on an oily metal, while if the surface tension is



Rubber-Lined Steel Tank

Pickling copper wire rod coils in the plant of a large cable manufacturer is accomplished with maximum speed and economy, and handling operations are simplified by means of an electrically controlled hoist. The welded steel pickling tank is lined with a 3/16 in. thickness of Triflex rubber — a combination hard and soft rubber lining developed by the B. F. Goodrich Company, Akron, Ohio. A pickling solution of 20 per cent sulphuric acid at 165 deg. F. is used in this operation.

small, the liquid will spread easily on the metal, for example, a drop of alcohol on an oily metal. The lower the surface tension between the metal and liquid the more easily it wets the metal. Oil wets metal more easily than water does. If a perfectly clean metal is submerged into water it will be wetted by the water, but if one drop of oil is stirred up with the water and metal, the oil drop will be found clinging to the metal, having displaced the water. Now a cleaning operation is just the reverse of this. The water must be made to displace the old. This can only be done by so reducing the surface tension of the water that it wets the metal more easily than the oil does.

Almost any material dissolved in water will lower its surface tension. If in the experiment of floating a needle on water a small amount of soda, trisodium phosphate or soap is added to the water, the needle will sink because the surface tension will no longer be able to support it. In general, the same materials serve as wetting agents as those that are emulsifying agents. In recent times the sulfonated higher alcohols have come into prominence as wetting agents. They are somewhat expensive and are generally not quite so good as emulsifying agents. The derivatives of rosin, however, are good, both as wetting and as emulsifying agents.

The last of the principles of cleaning is that of deflocculation, which means the gathering together of small particles into larger ones. Small particles of solids have a tendency to cling to solid surfaces as chalk to the blackboard or dust on an automobile. The finer the particles the more tenaciously they stick. The cleaner should have the property of causing these fine particles to stick together and form larger agglomerates which will have less tendency to stick to things and will ultimately settle out of the solution on account of their size. The inorganic or mineral salts have the ability to do this and are to be found in practically all cleaning compounds.

To summarize then, a cleaning compound for best results should possess the ability to saponify vegetable and animal oils, to promote the formation of emulsions, to reduce surface tension and promote wetting and to cause fine particles of solids to coagulate. Only a well balanced cleaning compound will possess all of these properties. It is the product of long experience, specialized scientific knowledge and careful compounding.

Duriron Heat Exchangers. An illustrated 8-page bulletin describing the construction and use of two different size heat exchangers for corrosive liquids, such as pickling and plating solutions, is now being issued by the Duriron Company, 450 N. Findlay St., Dayton, Ohio. A copy will be sent free upon request.

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Application of Plate Type Copper Oxide Rectifier to the Electro-Plating Industry

The author discusses the latest development in a source of low voltage, high amperage direct current.

By CLARENCE E. BERGER,

Electrical Engineer, Hanson-Van Winkle-Munning Co., Matawan, N. J.

FOR those manufacturers who require a source of low potential direct current for electrochemical processes at 6 volts or less, and who need fairly sizeable volumes, the choice lies primarily between the two types of equipment—the motor generator set and the plate type copper oxide rectifier.

During the last half century, the low voltage motor generator set as made in the United States has been brought to a very high state of perfection, and for some applications it is still the best type of equipment to use.

The commercial background of the copper oxide rectifier is only about ten years old. During this decade many thousands have been built for battery charging and other purposes, in the form of discs with low wattage output. For high wattage, the plate type has been developed and this form of rectifier has already had some years of experience behind it, both in the United States and in Europe.

General Characteristics of Rectifiers

Rectification, or the conversion of alternating current into direct current, can be accomplished by devices which fall into five distinct classifications. A common example of each of these classes is given below:

(a) the vibrating reed
(b) the mercury arc
(c) the hot cathode or Kenotron tube
(d) the lead-aluminum electrolytic rectifier
(e) the galena crystal rectifier.

The copper oxide rectifier belongs in the same class as the galena crystal; what is known as Composite Conduction Rectifiers and sometimes referred to as Junction or Contact Rectifiers. The last two names mentioned are more accurately descriptive of the actual construction of the copper oxide rectifier. Types a, b, c and d above have some useful applications but are not suitable for the produc-

tion of large volumes of current at low voltages. It is for this type of work that the copper oxide rectifier is ideally suited.

Process of Rectification

The high voltage A.C. leads must be led in through suitable devices for connection and disconnection to protect the installation from overloads and short circuits. This is accomplished by a standard contactor, push button operated, with overload and low voltage protection. The current is then led to a suitable step-down transformer, which changes the current (still A.C.) to low voltage high amperage current. This transformer has the necessary taps on the primary or the high voltage side to give close voltage control over a wide range on the low voltage side. These taps are connected to a suitable dial switch, operated from the front of the rectifier. In the smaller sizes it is not necessary to shut off the power in changing taps, but in the larger sizes, power must be shut off before making the change.

The low voltage A.C. output from the main transformer is then connected to the rectifier plate assemblies which are really the heart of the rectifier. Here rectification takes place in a series of copper plates which have been oxidized by a special heat treating process so that they have a uniform, dense and highly adherent coating of copper oxide. It is at the contact surface of the copper and the copper oxide that rectification takes place in a distance infinitely small, without the presence of any arcs or solutions, and with no moving parts involved. Contact for one polarity is made to the pure copper and for the other to the copper oxide coating by means of a sprayed metal coating and spring connectors. A number of such plates are then assembled into a rack with air spaces between them and the proper A.C. and D.C. connections and terminals are brought out.

To provide moving air through the spaces between the rectifier plates, a fan is installed which assures a

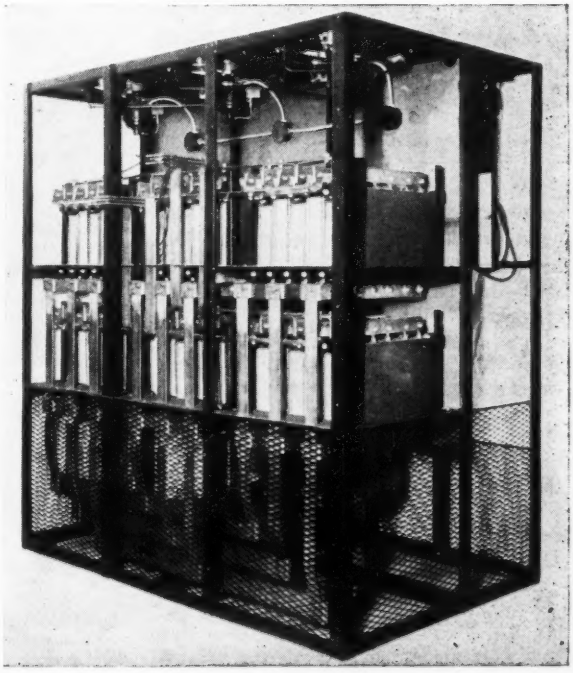

Fig. 1—Interior view of a 3,000 Ampere 6 Volt Rectifier

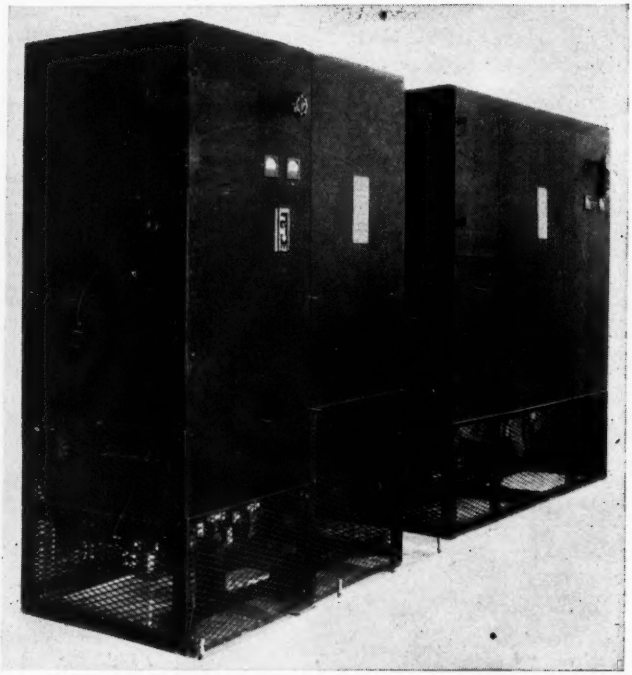

Fig. 2—A 1,500 ampere plate type copper oxide rectifier is shown in the foreground and a 3,000 ampere unit with the same voltage is shown in the background.

proper flow of cooling air over all of the plates. An air vane relay is provided to stop the operation of the rectifier in case of fan failure.

All of the parts described above are assembled into a cabinet together with the necessary meters to make a complete, self-contained unit. No special foundation or grounding-in is required. The unit need only be placed in a clean and well ventilated spot and connected to the A.C. power leads and the D.C. output leads. By pushing the "start" button and selecting the voltage at which it is necessary to work, by means of the tap changing switch, the rectifier is in operation. There is practically no installation expense.

In performance, the rectifier has much to recommend it. In sizes up to 3,000 amperes, it has a high efficiency and a power factor of approximately 95 per cent. The voltage regulation is approximately 20 per cent which compares favorably with a shunt wound generator. The plate type copper oxide rectifier is no longer an experimental device but a sound, commercially practical and proven type of electrical equipment.

"Shriver Filter Presses and Diaphragm Pumps Catalog No. 38." This is the title of an instruction manual on selection and proper operation of filtration equipment which is now being issued by T. Shriver & Company, 861 Hamilton St., Harrison, New Jersey. The catalog is divided into the following sections: The Shriver Filter Press, Selection of Filter Presses, Recessed Plate Metal Filter Presses, Side Feed Metal Filter Presses, Corner Feed (Eyed) Metal Filter Presses, Wood or Rubber Filter Presses, Small Filter Presses, Parts and Accessories, Operation of Shriver Filter Presses, Shriver Diaphragm Pumps, and Applications and Installations.

The Shriver Filter Presses are said to be especially adapted for plating solutions. The catalog is profusely illustrated with diagrams for plant layouts and installation photographs. Specific tables and size and capacity charts are also included.

Copies of this catalog will be sent to individuals requesting it on their firm letterhead.

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Testing the Modern Finish

In this article the author describes mechanical weathering and outdoor exposure tests.

By Ray C. Martin

THE exposing of coatings to climatic conditions tend to deteriorate films. This deterioration may be through pigment and thence the "binder" or through the clear vehicle itself. Customary manufacturers' paint coating tests involve exposure to the weather at a 45 deg. angle, facing South, exposure of Florida or California or by means of a "weather machine". This weathering device will simulate various weather conditions and tends to hasten testing or deterioration of films. It is a quick means of determining the value of protective coatings.

The combination of light and moisture is the most destructive agency in the deterioration of protective coatings.

A device known as the Weather-O-Meter is used and has become a standard medium of industry and scientific laboratories for accelerated reproduction, study and measure of the reactions of sun, rain, washing, cold and heat in their relation to protective coatings.

The Weather-O-Meter consists of a chamber fitted with violet-carbon arc as the light source. The light is suspended in the center of the chamber, and is the nearest approach to direct sunlight. Inside this chamber is a rotating cylinder on which is placed panels for exposure. These are arranged in tiers. Moisture control is maintained through a stationary outlet either at the side or a rotating cylinder centrally located at the bottom of the chamber.

Light, moisture and temperature control are responsible for the aging, deterioration and final breakdown of the exposed protective film.

The moisture as produced in the form of rain is of two kinds, the mild rain or spray which is shielded from the light and moistens the panels under exposure 1½ minutes in every 20 minutes. In the 24 hour cycle this action continues for 17 hours and is then followed by a vigorous or driving rain with the lamp elevated. This driving rain cools the panels and interior to a much lower temperature than during the 24 hour cycle.

The Weather-O-Meter can be operated 24 hours a day. A standard exposure day follows:

Carbon arc light and gentle spray	17 hours
Vigorous water spray (about 100 deg. F)	3 hours
Refrigeration (about —7 deg. F.)	1 hour
Inspection of panels	3 hours

The first day of exposure should constitute 17 hours of light alone without the mild spray. Succeeding days will then include the above schedule. A week of exposure to accelerated weathering is equal to four months of outdoor exposure.

Panels when exposed should constitute complete finishing schedules involving, that is, primer, surfacer, enamel, and so on. Panels should be

coated on sides, edges, and backs before cabinet exposure.

This accelerated weather test is intended primarily for metal coatings of all kinds.

Outdoor Exposure Test

Industry, as well as manufacturers of protective coatings, have their own "paint farms" where exposures are directed to sun and weather influences. A rack suitable for holding the panels, or parts for exposure, at a 45 deg. angle, facing south, is the customary media. Portions of panels are customariiy protected so that chalking, fading or general deterioration may be easily discerned.

As a means of measuring the value of a coating, a per cent rating is often given. This may vary with the desired object of investigation. Metal finishes will vary.

Types of Film Failures and Corrections

Film failures are often accentuated by such faults as over or under baking, improper solvent balance, air line and spraying troubles, improper adhesion, alligatoring, blistering and bubbling, improper application, bottom drying, bridging, brittleness, chalkiness, checking and cracking, crazing, improper drying, filler troubles, heaving, lifting, pinholing, scaling, skinning.

These and many more expressed "troubles" have a direct bearing on film failures. Improper application or application over a questionable surface is probably more responsible than material deficiency. Each type of failure will exhibit by its manner of failure, the cause and point out the correction. Most film failures are unnecessary in industry and, repeating, are due to improper handling.

Ferro Enamel Technical Bulletin No. 2. Technical Bulletin No. 2 deals with the stabilization of the reflectance and color of recoat enamels. It is a report of an original investigation conducted by two of the staff members of the Research Laboratories of the Ferro Enamel Corporation. It is the second of the series of such bulletins that will appear as other investigations are completed. No regular publication dates will be followed, but the bulletins will be numbered consecutively for convenience in reference and filing.

The researches reported in Technical Bulletin No. 2 lead to the development of a new material for the porcelain enamel industry. The matching of the color and reflectance of essentially white ware, requiring re-operation because of processing defects, has always been a difficult and costly process. A material has now been made available which, when added to the recoat enamel during the milling, stabilizes the color and reflectance of the fired enamel at any desired predetermined value, thereby rendering further matching of parts for color and reflectance unnecessary.

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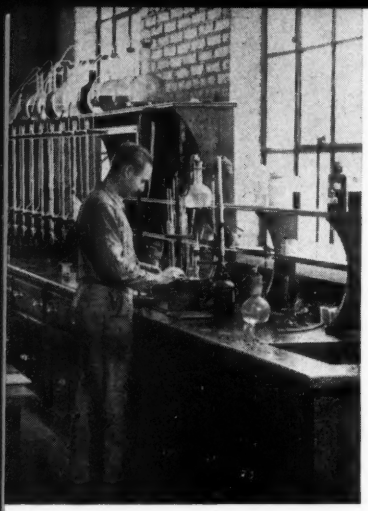

the FINISHING forum

Painting on Cadmium Plating

By W. E. Warner

WE experienced difficulty with paint adhesion on cadmium plating, and while the precaution of reducing the handling of the parts and cleanliness gave some improvement it did not entirely overcome the trouble. A method for increasing adhesion was found by giving the work a rinse in cold water immediately following plating and then immersing it for five seconds in a 4 per cent solution of chromic acid. A final rinse was then given in hot water.

This treatment will clean the cadmium parts of any chemicals and will etch the surface sufficiently to improve the paint adhesion. In our plant, this treatment gave a complete remedy and no difficulty was afterwards experienced with any finish applied.

Manual of Electroplating Solution Analysis and Control

By E. A. Blount

The following is the third installment of a comprehensive plating solution analysis and control procedure.

Cyanide Silver Solution

A. Determination of Silver

1. Pipette a 10 cc. sample of silver solution into a 250 cc. flask.
2. Add 5 cc. concentrated nitric acid and 10 cc. concentrated sulphuric acid. (Poisonous cyanide fumes are given off.)
3. Boil until dense white fumes appear and all the precipitate has dissolved.
4. Cool, add 100 cc. of distilled water and 1 cc. of 2 per cent ferric ammonium sulphate indicator.
5. Titrate with standard sodium thiocyanate solution to the appearance of a faint pink color.
6. Cc. of standard sodium thiocyanate used in (5), times Silver Factor equals ounces per gallon silver.
7. Solutions used:
   (a) Standard sodium thiocyanate contains 10 grams of C.P. sodium thiocyanate per liter.

B. Standardization of Standard Sodium Thiocyanate

1. Pipette 10 cc. of .1 normal silver nitrate into a 250 cc. flask.

2. Add 100 cc. distilled water and 1 cc. of 2 per cent ferric ammonium sulphate indicator.
3. Titrate with standard sodium thiocyanate until a faint permanent pink appears.
4. Silver Factor equals 1.443 divided by the cc. of Standard sodium thiocyanate used in (3).

C. Determination of Free Sodium Cyanide
1. Pipette a sample of silver solution into a 250 cc. flask. (10 cc. sample.)
2. Add 100 cc. of distilled water and 1 cc. of 10 per cent potassium iodide.
3. Titrate with .1 normal silver nitrate until a faint turbidity appears.
4. Cc. of .1 normal silver nitrate used in (3), times .131 equals ounces per gallon free sodium cyanide.
5. Ounces per gallon free sodium cyanide times 1.33 equals ounces per gallon free potassium cyanide.

D. Determination of Sodium Carbonate
1. Pipette a 10 cc. sample of silver solution into a 250 cc. breaker.
2. Add 100 cc. hot distilled water and 35 cc. of 10 per cent barium nitrate solution.
3. Filter through fine filter paper and wash until washings do not color phenolphalein indicator pink.
4. Return filter paper and precipitate to breaker used in (1).
5. Add 150 cc. of hot distilled water and three drops of methyl orange indicator.
6. Titrate with 1.0 normal sulphuric acid to a faint permanent pink.
7. Cc. of 1.0 normal sulphuric acid used in (6), times .706 equals ounces per gallon sodium carbonate.

E. Estimation of Potassium Nitrate
1. Potassium nitrate is estimated in the new silver cyanide-potassium nitrate bath by measurements of specific resistivity.
2. The potassium nitrate concentration corresponding to the specific resistivity can be read directly from curves prepared by Donald Wood and presented at the 1937 convention of the American Electroplaters Society.

F. Standards
1. Silver: 2.0 to 4.0 ounces per gallon.
2. Free sodium cyanide: .5 to 2.5 ounces per gallon.
3. Sodium carbonate: 3 to 10 ounces per gallon.
4. Potassium Nitrate: 16 ounces per gallon (Wood's nitrate bath).

Tin Solution

A. Determination of Tin as Sodium Stannate
1. Dilute a 5 cc. sample of tin solution to 150 cc. in a 250 cc. beaker.

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2. Warm and neutralize with 10 cc. of 10 per cent (by volume) glacial acetic acid.
3. Filter through a Whatman No. 40 filter paper (or its equivalent) and wash with hot water.
4. Ignite the filter paper and precipitate in a porcelain crucible.
5. When ignition is complete add a small lump of sodium cyanide and fuse until a ball of tin appears at the bottom of the crucible.
6. Cool and dissolve out the fusion residue with hot water.
7. Wash ball of tin in boiling distilled water and dry 10-15 minutes in an oven at 120 deg. F.
8. Cool and weigh ball of tin.
9. Weight of tin (in grams) times 4.81 equals ounces per gallon sodium stannate.

B. Determination of Sodium Hydroxide
1. Pipette a 10 cc. sample of tin solution into a 250 cc. beaker.
2. Add 100 cc. distilled water and 25 cc. of 10 per cent barium nitrate solution.
3. Stir, cover and allow to stand and settle.
4. Filter and wash until washings do not turn phenolphthalein indicator pink.
5. Dilute the filtrate to 200 cc. and add 3 drops of .01 per cent thymolphthalein indicator.
6. Titrate with 1.0 normal hydrochloric acid until the blue color just disappears.
7. Cc. of 1.0 normal hydrochloric acid used in (6) times .535 equals ounces per gallon free sodium hydroxide.

C. Determination of Sodium Acetate
1. Pipette 50 cc. of tin solution into a 400 cc. beaker.
2. Add 50 cc. distilled water and 1 drop of phenolphthalein indicator.
3. Add 50 per cent (by volume) sulphuric acid until the pink color fades.
4. Filter through semi-fine filter paper and wash thoroughly.
5. Add 30 cc. of concentrated sulphuric acid to the filtrate and washings and place the mixture in a glass distilling flask.
6. Distill until the first sign of white fumes appears.
7. Add 1 drop of phenolphthalein indicator to the distillate and titrate with 1.0 normal sodium hydroxide until the solution turns pink.
8. Cc. of 1.0 normal sodium hydroxide used in (7), times .22 equals ounces per gallon sodium acetate.

D. Determination of pH
1. Use pH meter.

E. Standards
1. pH: 13 to 13.5.
2. Sodium stannate: 10 to 20 ounces per gallon.
3. Sodium hydroxide: 1 to 2 ounces per gallon.
4. Sodium acetate: 2 to 4 ounces per gallon.

Cyanide Brass Solution

A. Determination of Copper
1. Use Method C under Cyanide Copper Solution.

B. Determination of Zinc
1. Use Method C under Cyanide Zinc Solution.

C. Determination of Free Sodium Cyanide
1. Use Method A under Cyanide Copper Solution.

D. Determination of Sodium Carbonate
1. Use Method E under Cyanide Copper Solution.

E. Determination of pH
1. Use pH papers.

2. Use color comparator.
3. Use pH meter.

F. Standards
1. Copper: 2 to 3 ounces per gallon.
2. Zinc: .5 to 1.0 ounces per gallon.
3. Free sodium cyanide: 1.5 to 2.5 ounces per gallon.
4. Sodium carbonate: 5 to 10 ounces per gallon.
5. pH: 9.8 to 10.3.

Cyanide Gold Solution

A. Determination of Gold
1. Pipette a 10 cc. sample of gold solution into a 250 cc. beaker.
2. Add 10 cc. of concentrated hydrochloric acid and heat until solution clears (Poisonous cyanide fumes).
3. Add 100 cc. distilled water and 50 cc. of clear .5 normal ferrous sulphate solution.
4. Stir well and allow to stand 3 hours.
5. Filter through ashless filter paper and ignite the paper and precipitate in a porcelain crucible.
6. Calculate the weight of the gold precipitate.
7. Weight gold in (6) in grams times 13.4 equals ounces per gallon gold.

B. Determination of Free Sodium Cyanide
1. Use Method A under Cyanide Copper Solution.

C. Determination of Sodium Carbonate
1. Use Method E under Cyanide Copper Solution.

D. Standards
1. Gold: .25 to 1 ounce per gallon.
2. Free sodium cyanide: .5 to 4 ounces per gallon.
3. Sodium carbonate: 2 to 5 ounces per gallon.

Acid Gold Solution

A. Determination of Gold
1. Pipette a 10 cc. sample of gold solution into a 250 cc. beaker.
2. Proceed from A-3 under Cyanide Gold Solution.

B. Determination of Free Hydrochloric Acid
1. Pipette a 10 cc. sample of gold solution into a 250 cc. Flask.
2. Add 100 cc. distilled water and 5 drops methyl orange indicator.
3. Titrate with 1.0 normal sodium hydroxide until the solution turns pink.
4. Cc. 1.0 normal sodium hydroxide used in (3), times .488 equals ounces per gallon free hydrochloric acid.

C. Standards
1. Gold: 3 ounces per gallon.
2. Free hydrochloric acid: 6 ounces per gallon.

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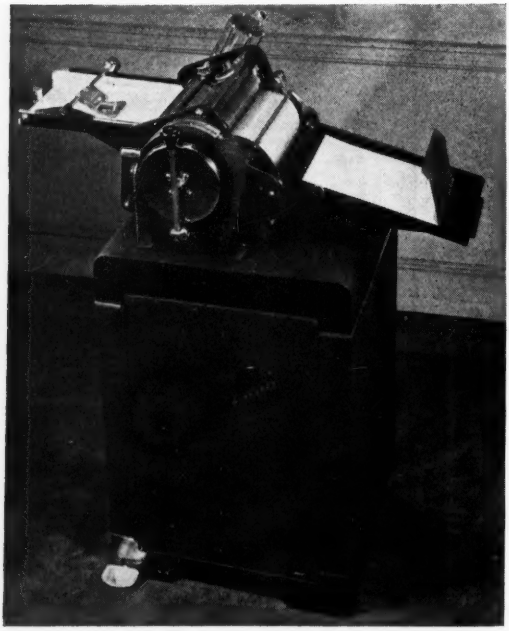
FINISHES *that aid in Appearance & Utility*

(Right)—A "multi-chrome" cabinet pull with interchangeable color stripes that offers home owners a pull that will harmonize with the coloring of modern kitchens. The cabinet pull is made of wrought brass and is chromium plated. In the face of each pull is a slot in which a strip of red, ivory, black, blue, green, orchid, yellow or white Viscaloid can be inserted.

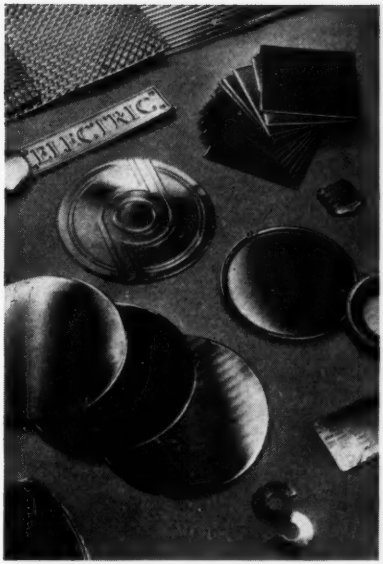
(Photo Courtesy The Stanley Works)

(Photo Courtesy Standard Mailing Machines Co.)



(Left)—This fluid process duplicator mounted on a cabinet of heavy steel construction is fully soundproof. The unit is equipped with a new black Alumite feed tray. The side walls finished with a black fluid-resisting finish combine attractively with the lustrous chromium plated parts.

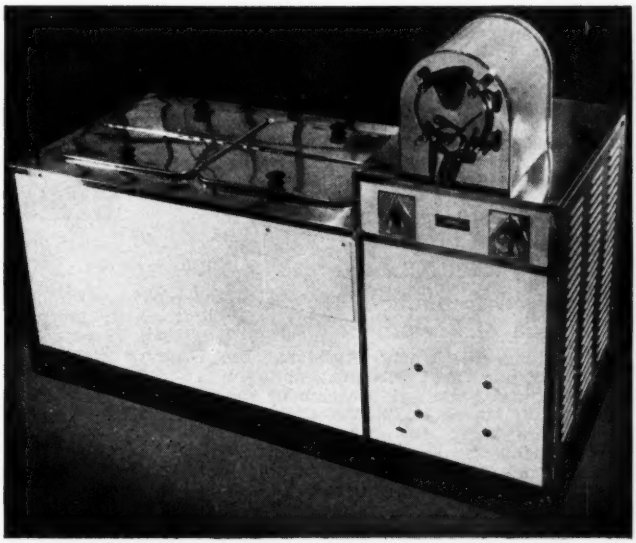
(Right)—The thinness and strength of this metal lends itself very well to the forming of parts such as cosmetic cases, nameplates, escutcheons, and so on. These items have a semi-brilliant finish.

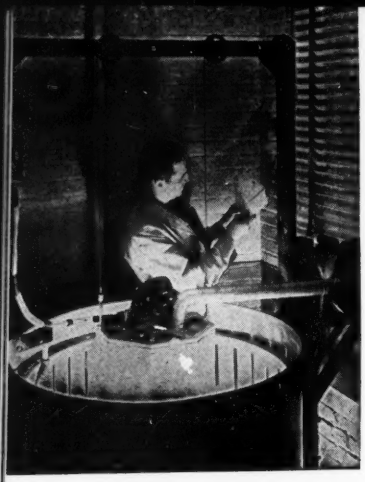


(Photo Courtesy Ludlum Steel Co.)

(Photo Courtesy Mills Novelty Company)

(Right) — The side walls of the counter-type ice cream freezer are finished with white Dulux baked enamel. A scuff board around the base is finished in black. The top and metal moldings are nickel plated.





NEWS of the Industry

Walter K. Dow Elected Vice-President of The Alexander Milburn Company

According to a recent announcement, Mr. Walter K. Dow was elected vice-president of The Alexander Milburn Company, 1436 W. Baltimore St., Baltimore, Maryland.

Mr. Dow has been plant superintendent of The Milburn Company for the past year and is especially skilled in the development and production of paint spray equipment, welding and cutting apparatus, portable lights and so on

Detroit Rex Opens Branch Office In San Francisco

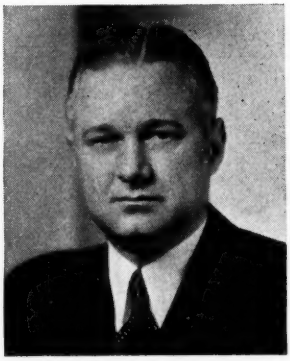
Detroit Rex Products Company, 13017 Hillview Ave., Detroit, Mich., has recently opened a branch office at 111 Sutter Bldg., San Francisco, California. This branch office will be in charge of Mr. W. A. Vensel. Ample warehouse stocks of Detrex degreasers, Perm-A-Clor and Triad solvents, and Triad alkali cleaners and strippers will be carried for immediate delivery to all points in this territory.

Hammond Announces New Location of Eastern Branch

Hammond Machinery Builders, Inc., 1601 Douglas Ave., Kalamazoo, Mich., has announced the new location of their eastern branch as 71 West 23rd St., New York, New York. According to the announcement, an increased demand for Hammond products in the eastern states has necessitated this acquisition of more spacious quarters. At the new location, grinders and polishers are on display for the purpose of inspection.

H. B. Spackman Appointed Vice-President of Lyon Metal Products, Inc.

According to an announcement of the Board of Directors, Lyon Metal Products, Incorporated, Aurora, Ill., Mr. H. B. Spackman has been appointed vice-president in charge of sales and advertising. The sale and advertising of all Lyon Products are under Mr. Spackman's direction. The fields covered by Lyon Metal Products include industrial, institutional, store fixture, automotive, department store and office equipment.



H. B. Spackman

International Nickel Expands Technical Field Service

Mr. A. J. Wadhams, Vice-President and Manager of the Development and Re-

search Division, The International Nickel Company, Inc., 67 Wall Street, New York, N. Y., has announced the establishment of a field office located in the Grant Building, Pittsburgh, Pa.

The office is under the direction of Mr. H. V. Beasley, who for the past three years has been attached to the New York office.

The main function of this office will be to promote applications of Nickel alloy steels and products of the Huntington Mill and stimulate interest in Nickel cast irons and the use of Nickel in non-ferrous alloys.

This is the fifth field office opened by the Development and Research Division to give manufacturers in the various industrial districts prompt service in handling their metallurgical problems. Other offices are located in Los Angeles, Calif., Chicago, Ill., Detroit, Mich., and Hartford, Conn.

Amercoat Sales Agency Established in Huntington Park, California

The American Concrete & Steel Pipe Company, South Gate, Calif., has recently announced the establishment of a sales agency to be located at 5905 Pacific Blvd., Huntington Park, California.

The new sales company was organized and will be managed by Miles C. Smith, formerly sales manager of the Amercoat Division of American Concrete & Steel Pipe Company. It has been planned to market Amercoat products internationally, through American Concrete & Steel Pipe Company branches, as well as through distributors, dealers and sales agents.

The Amercoat line of coatings are synthetic organic plastic solutions for cold applications to metal surfaces. The coatings can be applied to exterior and interior metal surfaces which are subject to corrosion.

Fansteel Metallurgical Corporation Appoints Michigan Tool Company as Representative

Fansteel Metallurgical Corporation, North Chicago, Ill., has appointed Michigan Tool Company, Detroit, Mich., as sales representative for Tantaloy hard cutting metal and Tantaloy tipped tools.

Willson Products, Inc. Occupy Enlarged Plant

Willson Products, Inc., 271 Thorn St., Reading, Pa., manufacturers of goggles, helmets and respiratory protective devices for dust hazards, has just completed a half million dollar plant building program. Some idea of the size of the enlarged five-floor factory may be gained from the fact that it contains in excess of 110,000 square feet of floor space. The building is a model fire-proof structure, incorporating every known safety device and is said to be exceptionally well lighted and ventilated.

Enlarged Plant of Willson Products, Inc.

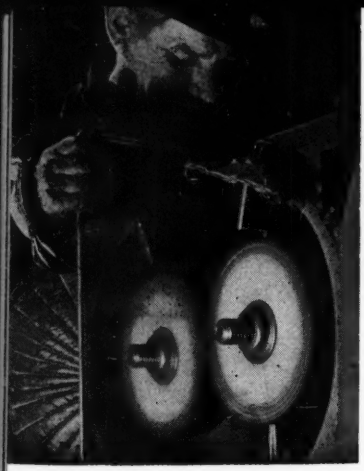
Packer Machine Company Moves Into New Factory

The Packer Machine Company, Meriden, Conn., pioneer builders of automatic polishing and buffing machines, has recently moved into its new factory located at 452-456 Center St., Meriden, Connecticut.

The new factory is of fire-proof construction, of modern design, and is said to increase the amount of floor space approximately 400 per cent more than the old location on Britannia Street. The new factory is located on the main line of the New York, New Haven & Hartford R. R. and there is a spur line connected with the factory. The new factory is so situated on the property that further expansion can be made in the future.

In the new factory will be established an electric welding department to facilitate efficient handling of all welding construction.

The purchase of this new factory building was necessary because of the added manufacturing equipment necessary to take care of the increased output of Packer Automatic Polishing and Buffing Machines.

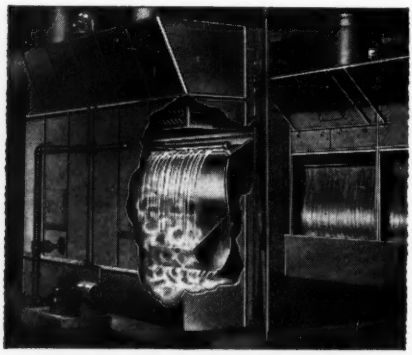


NEW *Plant equipment and* MATERIALS

Newcomb-David Torrent Type Spray Booth

Newcomb-David Company, 5747 Russell St., Detroit, Mich., has recently introduced a new water type spray booth to be known as the "Newcomb-David Torrent Type Spray Booth". This type of spray booth is of special construction and is said to incorporate a new principle of operation. It is economical in average production use and requires a minimum horsepower for operation.

In the Torrent Type Spray Booth, the water is drawn from the sludge tank and pumped to a horizontal pipe located near the top of the booth. The water pours in a steady volume from this pipe into a trough which deflects one-half of the water into the cleansing chamber at the back of the booth and the other half over the water curtain which flows behind the object being sprayed.



Newcomb-David Torrent Type Spray Booth

A positive suction fan above the booth carries the paint and fume laden air and a large volume of water which is entering the sludge tank from the water curtain, into the cleansing chamber. As the air and water are drawn up, they meet the cascade of water pouring from the pipe and trough at the top, with the result that a violent churning of air and water is developed in the chamber. Because of this churning action, the air is thoroughly cleansed before it reaches the eliminating plates in the top of the booth and the fan in the exhaust stack.

As paint is sprayed against the water curtain located at the rear of the booth, it is immediately carried downward to the sludge tank at the base of the spray booth. No paint accumulates on the walls or back of the booth, and that which is deposited and preserved in the sludge tank can easily be removed for reclaiming.

The principal feature of the Newcomb-David Torrent Type Spray Booth is that, with the elimination of nozzle resistance, a much greater volume of water is pumped with less horsepower. This type of spray booth is sturdy in construction and also offers a maximum length of trouble-free service.

Munning & Munning Rubberized Glass Insulating Tape

Munning & Munning, Inc., 202 Emmett St., Newark, N. J., has recently placed on the market an impregnated woven glass tape for electrical and chemical insulation. This material is available on reels as shown in the accompanying illustration in widths from ¼ in. to 6 in. with varying thicknesses of coatings and pliability. Rubberized Glass Insulating Tape is a woven glass fabric made from

spun glass fibres impregnated with a synthetic rubber covering. The exceptional thinness and high strength of the glass fabric, combined with the acid resisting and dielectric properties of both the rubber and the glass, enables this tape to be used for many purposes.

One of the outstanding present applications is found in its effective employment as an insulating medium between ventilating hoods and plating tanks; between direct-connected blowers and hoods; as an insulator under conductor bar supports; and as a gasketing material for electroplating equipment. The Rubberized Glass Insulating Tape is not absorbent and will repel moisture and water.

Munning & Munning Rubberized Glass Insulating Tape

The Munning & Munning Rubberized Glass Insulating Tape has been found extremely useful for the insulation of heavy duty plating racks of large cross section; as a desirable covering for steam heating coils at the solution levels where temperature and oxidation react; and also as a cover to protect those portions of anode and cathode rods between the anode hooks and the work hooks from becoming covered with solution which forms salts and ultimately impairs good contacts.

In specific instances, the Rubberized Glass Insulating Tape can be used in plating operations as masking band to stop off deposits on special articles where the tape can be conveniently applied and removed.

Pynosol Alumin-Nu

A polish which is said to restore aluminum to a mirror finish by dissolving oxidation, stains, and so on, to be known as "Alumin-Nu", has been placed on the market by Pynosol Laboratories, Inc., 166 N. Aberdeen St., Chicago, Illinois. Excellent coverage is said to be obtained with Alumin-Nu.

In addition to restoring aluminum to a mirror-like finish, Alumin-Nu acts equally well on pewter and silver, gold, platinum, stainless steel, chromium, nickel, brass, Dirigold, and baked-enamel surfaces.

Dolan Rub-Less Lacquer

V. J. Dolan & Co., 1832 N. Laramie Ave., Chicago, Ill., has placed on the market a lacquer to be known as "Rub-Less." This lacquer is said to contain a solvent that keeps a coating in liquid state for a short period after it has been sprayed on a surface. The lacquer flows out and assumes a flat surface and requires only a small amount of rubbing in order to produce a smooth finish.

In addition to the lacquer, V. J. Dolan & Co. has also announced a bleaching material to be known as "Du-Bar." This material can be used in a single application by spraying or brushing for bleaching purposes.

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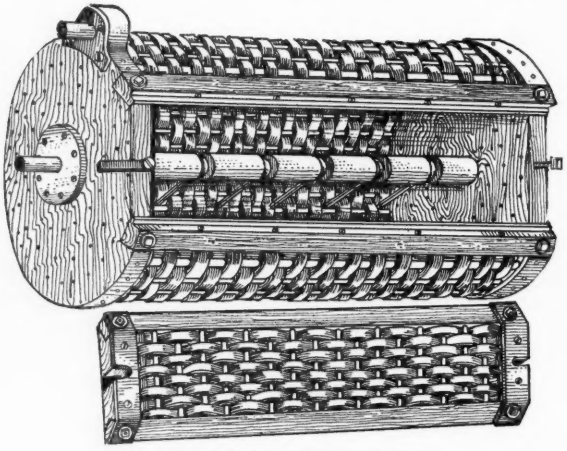
RUMFORD CHEMICAL WORKS

RUMFORD, RHODE ISLAND

King Wood Woven Plating Barrel

Wood woven plating barrels for all types of barrel plating have been placed on the market by John King, 49 Springfield St., Dayton, Ohio. The woven barrels are designed in such a manner that they do not rattle the work but gently and positively agitate it. The covers are made flat so that in each revolution the work is completely rearranged.



King Wood Woven Plating Barrel

The inside contents can easily be removed, cleaned and replaced. The cover lock is said to be safe and reliable. Flat work will not cling or stick to the uneven surface of the interior of the barrel, thereby eliminating all streaks, spots and burns. A close woven surface barrel is available for small work. The woven weave is made for the general run of work.

The King Wood Woven Plating Barrels are constructed to rotate at 1½ or 2 R.P.M. Due to the woven construction, the King Wood Woven Plating Barrels will give a maximum amount of agitation. The agitation and not the speed will give a clean, fast and smooth plate.

The interchange or flow of solution through the weave is readily possible. The wood absorbs the solution and its metal contents, thereby making the barrel a sub-anode, which produces a clean and fast plate. Actual tests have shown that the amperage inside of the barrel is equal to the amperage outside of the barrel.

The barrel is made for any solution that is not over 125 deg. F. or others not more than 8 to 10 oz. of cyanide per gallon.

The King Wood Woven Barrels are made in two diameters, 12½ in. and 16 in. and lengths from 21½ in. up to 48 inches. Standard equipment includes shaft, danglers and spacers.

Watson-Standard Litho Black and White Coatings

The Watson - Standard Co., 225 Galveston Ave., Pittsburgh, Pa., has placed on the market a Litho Black Coating and a Litho White Coating. Either one of the two coatings can be applied by the roller method. One coat is required even when used on unsized metal. The coatings are said to withstand fabrication and sterilization.

The Litho Black Coatting provides a dense color which has great depth. It is easily applied and has wonderful flow.

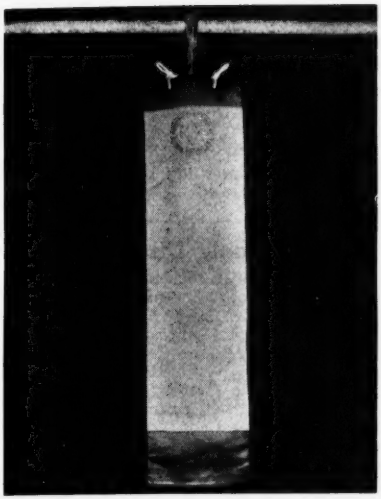
Litho White Coating is said to have excellent adhesion to metal. It is also said to provide a beautiful gloss and will retain its color.

Zialite Bright Copper Solution

A bright copper solution is now being marketed by the Zialite Corporation, 10 N. Bleecker St., Mt. Vernon, New York. The workpieces subjected to this solution are said to emerge from the plating tank with a very brilliant finish making polishing unnecessary. The work can be placed immediately in a bright nickel or chromium tank without polishing and the copper plate can be easily given oxidized finishes. The solution is said to be non-poisonous. It is also said to give no gas during operation.

H-V W-M Glass Cloth Anode Bag

A glass cloth anode bag for the purpose of keeping nickel solutions clean



H-V W-M Glass Cloth Anode Bag

has been recently placed on the market by Hanson-Van Winkle-Munning Co., Matawan, New Jersey. The glass cloth anode bag was developed in cooperation with the Corning Glass Company and is of one-piece, tubular construction, not sewed, but sealed by a special process at one end and protected from ravelling at the other end.

The H-V W-M glass cloth anode bag is flexible and not brittle. The glass cloth anode bag is recommended for all acid solutions and also for many alkaline solutions.

Sherwin-Williams Synthetic White Baking Enamel

The Sherwin-Williams Company, 101 Prospect Ave., N. W., Cleveland, Ohio, has recently placed on the market a white baking finish known as Kem Appliance White Baking Enamel. This enamel is said to be adaptable for application on appliances, furniture and general utility items. The color stability under high baking temperatures is said to be maximum. Application of the enamel is said to be easy and its exceptional build and opacity is said to make possible a full rich finish of unusual beauty.

In service, Kem Appliance White Baking Enamel is said to afford maximum resistance to discoloration under exposure to extremes of light, darkness, humidity, grease and ordinary chemical reagents. Excellent adhesion and hardness with high resistance to impact, marring, and wear are but a few of the many other features of Kem Appliance White Enamel.

Sherwin-Williams Kem Appliance White Enamel is available in both high and intermediate baking types to meet various baking requirements.

Palo-Travis Particle Sizer

Colloid Equipment Co., Inc., 50 Church St., New York, N. Y., has placed on the market a particle sizer to be known as "Palo-Travis". The Palo-Travis Particle Sizer is based upon a modification of the Werner apparatus. The Palo-Travis Particle Sizer involves a sedimentation method of analyzing particle sizes below 44 microns which is said to afford amazing accuracy of result as well as simplicity of design, speed and ease of manipulation. Large samples are unnecessary and accurate results can be obtained in about two hours from representative samples of less than 5 grams.

The apparatus operates on the principle that dispersed particles of dimensions exceeding the colloidal in a confined fluid medium tend to settle under force of gravity, and the rate of sedimentation proves the means of measuring particle size.

The Palo-Travis Particle Sizer is designed for use by the operator in actual plant control. The sizer consists of a large glass tube mounted on a support. The tube gives a height of fall slightly over 1 meter. A mixing chamber to hold the sample is separated from the large tube by a stopcock with an enlarged accurate bore to facilitate settling of material. A sedimentation measuring tube, flat bottomed and graduated in millimeters is supported by a rubber

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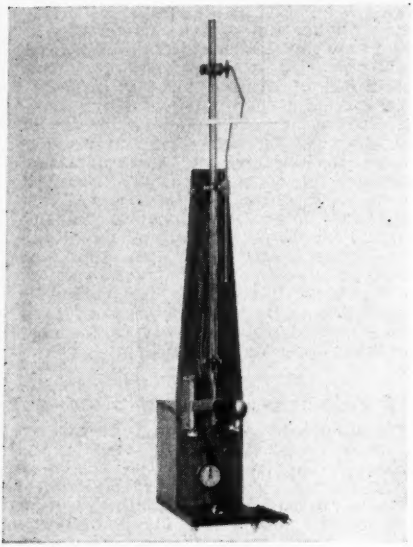


Palo-Travis Particle Sizer

stopper at the base of the large tube. A micrometer eyepiece mounted at the left of the sedimentation measuring tube enables one to read sediment heights in fractions of a millimeter. At the right of the sedimentation measuring tube is a small electric tapper and also an illuminating unit to facilitate in making readings. An electric stopcock is supplied on all instruments used at 110 volts, AC, 60 cycles.

The Palo-Travis Particle Sizer can be used anywhere in the industrial field where it is desired to know the particle size of a material.

Gunk Compound "M"

A self-emulsifying solvent cleaner or a cold immersion emulsion cleaner, to be known as Gunk Compound "M," has been placed on the market by The Curran Corp., 6 Pleasant St., Malden, Massachusetts. This compound is said to have a powerful affinity for mineral oils, wax or grease and will remove the last trace of them.

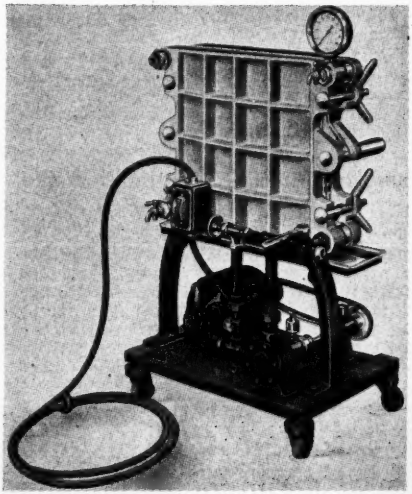
An area of 2000 to 3000 sq. ft. of metal can be degreased per gallon of Gunk Compound "M" without a drop of hot steam or gas heat. Gunk Compound "M" is non-caustic and is said to require no mixing. It not only dissolves but emulsifies the dirt coatings so that they may be rinsed free with water. It is said to be especially adapted for the cold immersion degreasing of aluminum castings, sheet steel, brass, zinc, delicate instruments, assembled typewriters, jewelry, and cold paint stripping.

Gunk Compound "M" is recommended for use with a "Hydro-degreaser."

Seitz Single Disc Filter

A single disc filter designated as "No. 40-1" which is acid resistant and can be used to filter any plating solution has been placed on the market by American Seitz Filter Corporation, 480 Lexington Ave., New York, New York. As a single disc filter, the Seitz No. 40-1 embodies all the features and filtering advantages of the larger size Seitz units. Solutions can be filtered in volumes up to 100 gallons per hour.

The Seitz engineering staff has simplified the design of the No. 40-1 so that it can be instantly expanded to a multiple disc unit merely by adding filter screens. No changes need be made and no extra parts are required. It can be expanded to a maximum of seven sheets. This unique simplification is said to result in low first cost, economy in operation, and an unusual flexibility.



Seitz Single Disc Filter with Pump and Motor

The Seitz No. 40-1 Filter is designed for 16 in. x 16 in. filter sheets. The front and rear heads are bronze, tin-plated. The unit can be obtained with a supporting stand, including pump and motor, or it can be mounted directly to the wall. No engineering skill is required to install or operate the No. 40-1.

The screen frames of the unit are said to conform to the high standards which have made Seitz filters outstanding. Frames are of tinned bronze and screening of Monel metal. Each additional filter frame operates as a separate filtering unit, and the hourly volume is increased in direct proportion to the number of frames added.

The pump is available either rotary or centrifugal type, silent in operation, with ample extra capacity beyond normal requirements. The pump is drip-proof and is equipped with a starting switch and 10 feet of rubber cable. The base is mounted stationary or on casters. The single disc unit has a filtering surface of 256 square inches.

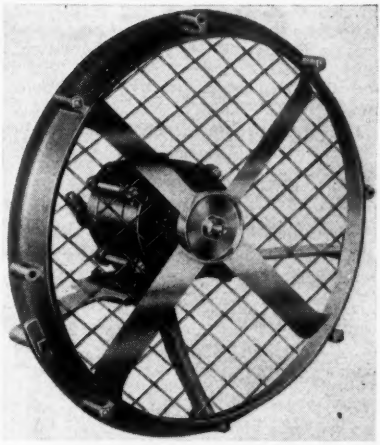
DeVilbiss Type JG Exhaust Fan

A new exhaust fan to be known as the Type "JG" and designed to effect rapid movement of a large volume of free air has been placed on the market by The DeVilbiss Company, 300 Phillips Ave., Toledo, Ohio. This fan, available with ¼ H.P. or ½ H.P. direct-connected electric motors, is said to provide an effective and economical means of exhaust wherever a general vapor, fume or dust condition prevails. The Type JG Fan is built for use with spray finishing equipment as well as for other exhaust purposes.

Ball bearing, explosion-proof electric motor with which the fans are equipped are said to meet the requirements of the Fire Insurance Underwriters for handling hazardous vapors as well as ordinary vapors, fumes and dust. They operate smoothly with a minimum of power consumption, and can be installed in window, wall or ceiling openings provided for this purpose.

The ½ H.P. motor turns a four-bladed fan 1725 R.P.M. to move 6,350 cu. ft. per minute. Where exhaust volume requirements are somewhat less, the two-bladed fan on the ¼ H.P. motor removes 5,250 cu. ft. per minute at the same revolutions per minute.

The construction of the fan is strong and durable. The ring is grey painted cast iron, and the blades are air foil type, made of highly polished aluminum to provide maximum draft with minimum size and weight. A one piece galvanized wire screen safety guard bolted on the motor side of the fan is said to give necessary protection when installation is within reach of persons in the room.



DeVilbiss Type JG Exhaust Fan

Hammond Type "J" Model "SH" Automatic Polishing and Buffing Machine

Hammond Machinery Builders, Inc., 1601 Douglas Ave., Kalamazoo, Mich., has recently announced an addition of a new model to their line of automatic polishing and buffing equipment to be known as the Type "J" Model "SH". This machine is designed for a wide range of work and will carry motors up to 7½ H.P. capacity. Rounds up to 10⅝ in. diameter and larger and odd-shaped flats

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Leaders in the field of tumble finishing

can be accommodated on this machine although it is primarily designed for rounds up to 6⅝ in. diameter which are held together by mechanical fixtures, and flats up to 3 in. by 6 in. held by magnetic chucks.

The illustration herewith shows heads

Hammond Type "J" Model "SH" Automatic Polishing and Buffing Machine.

with wheels on extended motor shafts. With this type of construction, the spindle speed is limited to the motor speed which on A.C. 60 cycle service is either 1750 or 3500 R.P.M. This machine, however, is available with Multi-V-Belt Driven Heads to provide any spindle speed that may be necessary.

A Geneva Rotated Table is equipped with 8 revolving spindles which are connected by chain sprocket drives to a ball bearing worm reducing unit. For loading and unloading, however, the 3 spindles at the operator's station cease revolving.

The table is driven by a ½ H.P. motor with a V-Belt Drive having variable pitch sheaves for quick and easy change of table indexing speeds. Production up to 1800 pieces hourly is possible, depending on the nature of the work.

Maas & Waldstein Wrinkle Finishes in Colors

A new line of wrinkle enamels, which is said to greatly extend the usefulness of this popular type of finish, has been developed by Maas and Waldstein Company, 438 Riverside Ave., Newark, New Jersey.

Heretofore, a wrinkle finish has been available only in dark colors, but Duart Wrinkle Enamels, as the new M & W line is called, can be supplied in every color including white and light pastel shades. Duart Wrinkle Enamels are said to bake hard and have high wear resistance with a short baking schedule. Uniform wrinkling, without glossy spots, "shiners" or "fish eyes", is also claimed for the new product.

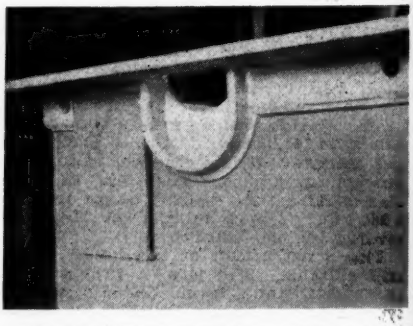
Maas & Waldstein Duart Wrinkle Enamels are light in body and can be sprayed like synthetic enamel, thus giving a high coverage per gallon. The spray patterns can be varied from a very fine and uniform to a very coarse and heavy structure. One coat is all that is usually necessary.

Brolite Polygloss

A finish material which is said to dry dust free in five minutes and hard in one hour, to be known as "Brolite Polygloss", has been placed on the market by Andrew Brown Co., 5429 S. Riverside, Los Angeles, California. This paint is said to contain a mild, non-toxic solvent and can be used for spot work over synthetic or lacquer finishes. It can be thinned with lacquer thinner but for maximum gloss and smoothness it is recommended that a special thinner be used.

Collord Multi-Ply Seamless Rubber Lined Tanks

Collord, Inc., 7049 Lyndon St., Detroit, Mich., has recently placed on the market a new and improved seamless rubber lining for tanks and other con-



Collord Multi-Ply Seamless Rubber Lined Tanks

tainers for plating and chemical service. The improved rubber lining represents an entirely new technique in latex rubber formulation. The name Multi-Ply S.R.L. designates the coalesced multiple plies of the new lining.

Multi-Ply S.R.L. is "tailored" to the tank or container in a single, seamless, smooth, unbroken finish. The entire lining can be bonded to the metal surface of the tank.

Quigley Insulblox Block Insulation

According to Quigley Co., Inc., 56 West 45th St., New York, N. Y., reduced heat storage and radiation losses at operating temperatures up to 2,200 deg. F. are claimed for "Insulblox", a light weight, low heat storage refractory block insulation. Insulblox is made from a highly stable, calcined, fire-clay base material with thin-walled minute cellular structure. The material can be directly exposed to 2,000 deg. F. and will withstand up to 2,200 deg. F. interface temperature.

It is not necessary to cement Insulblox, since it may be laid close together over roofs or arches or set into place behind brick work in furnace walls. They are easily cut or sawed to make special shapes to fit around steel work. Easy handling is assured by the light weight of approximately 30 lb. per cubic foot. Insulblox is furnished in thicknesses from 1 to 6 in., and in sizes from 6x36 in. to 12x36 inches.

Milburn OM Spray Gun

The Alexander Milburn Co., 1436 W. Baltimore St., Baltimore, Md., has recently placed on the market a spray gun to be known as the "OM" for spray finishing with various fluids. The OM Spray Gun is equipped with the revolutionary hollow air atomizer head, with integral locknut, which discharges air in hollow, conical shape from jets in the side wings, flattening the fluid by means of large, soft areas of air and atomizing to the outermost edges of the spray.

The hollow air system is especially adaptable for spraying synthetic enamels which are particularly difficult to atomize. It can also be used effectively with such liquids as lacquer, enamel, paint, shellac, varnish, stain, and so on.

An interesting feature of the OM Spray Gun is the integral fluid nozzle and cap. The nozzle is furnished in two styles, standard siphon or pressure feed and mushroom type pressure feed. Both nozzles are made of special steel, hardened and ground to absolute concentricity. The standard siphon feed nozzle has a smaller diameter surrounding the orifice but will operate on either siphon or pressure feed. The mushroom type pressure feed nozzle has a larger diameter and is tapered. It is especially designed for large production work and long life with fluids difficult to spray.

Milburn OM Spray Gun

The integral fluid nozzle cap is made of stainless steel. It closely fits a ground surface on the fluid nozzle. The atomizer head revolves around the fluid nozzle cap for vertical or horizontal spraying without disturbing the accuracy of the center air, which is said to be responsible for 95 per cent of the accurate work.

METALPREP Metal Cleaners
Destroy the Rusters-Etch the Metal
Used First--Make Your Paint Finish Last
Make the metal safe for paint, provide a firm bond and insure a long life to finish coats.
No Fire Hazard Mix With Water
Non-Toxic Non-Injurious Non-Volatile
Write for Details
NEILSON CHEMICAL CO.
DETROIT, MICH. WINDSOR, ONT.

The OM Spray Gun is equipped with a replaceable thread baffle ring assembly which is a revolutionary achievement eliminating the use of separate spray heads. This assembly is held to a true concentricity on the spray gun body by a ground shoulder on the fluid nozzle, thus assuring positive alignment of the atomizer head locking ring. Replacement of the entire gun body or spray head is eliminated when threads have become worn.

Burgess Air Filter

The C. F. Burgess Laboratories, Inc., 111 W. Monroe St., Chicago, Ill., has placed on the market a filter for ventilating and air conditioning systems, and air compressors. This type of air filter is made up of layers of expanded fibre that have been sprayed with a sticky compound that retains dust. A complete filter is made up in three sections—coarse, medium, and fine mesh. Each section consists of seven layers of fibre.

The Burgess Air Filter is rigid in construction and vibration cannot settle or pack the baffle surfaces. There is no odor and the filter is free of excessive stickiness and is clean to handle. After its ventilating capacity has reached its end point, the filter can be discarded.

Resistoflex Tubing for Solvents

Resistoflex Corporation, 370 Lexington Ave., New York, N. Y., has recently placed on the market a solvent resistant tubing to be known as "Resistoflex." Resistoflex is the trade mark and trade name of a flexible synthetic resin which is basically polyvinyl alcohol which is said to be inert to oils and organic solvents. It is said to retain its flexibility throughout a wide temperature range.

Resistoflex Tubing for Solvents

Resistoflex Tubing is said to be extremely light, the specific gravity being approximately 1.26. It is also said to be tough and so flexible that it can be tied into knots without incurring injury to the material. It is highly efficient in absorbing vibration.

At present, Resistoflex is offered in the form of tubing in standard sizes. Specially designed couplings have been developed for use with Resistoflex Tubing.

Neville 465 Resin

An entirely new, thermoplastic resin to be known as "Neville 465 Resin," has been recently placed on the market by The Neville Company, Neville Island, Pittsburgh, Pennsylvania. This modern synthetic resin is manufactured on an entirely new principle of modification of materials obtained from the by-product cooking of bituminous coal.

Raw materials for this dark brown resin are available in large quantities and its general physical properties are similar to those of the Neville Coumarone-Indene Resins.

Neville 465 Resin is said to retard the gelatin of chinawood oil to a maximum. When properly cooked into varnishes, it may be thinned 100 per cent with low priced petroleum naphthas. Neville 465 Resin is suggested for use in enamels and japans. This resin is said to afford good protection against water and dilute acids and is said to have maximum alkali resistance. Samples will be sent to those who request them by writing to The Neville Company on their firm letterhead.

DeVilbiss Type DGA Air Dusting Gun

A new type of air dusting gun, designed to meet a demand for a compact duster, has been placed on the market by The DeVilbiss Company, 300 Phillips Ave., Toledo, Ohio. This type of gun is designated as the "Type DGA" and is small enough to he held completely within the hand.

The Type DGA Gun can be quickly and easily operated by simply closing the hand around the gun and squeezing the one-piece thumb button and valve stem located in the middle of the gun body. An opening is provided in the zinc die casting body for hanging the duster on a hook when not in use. A removable

brass nozzle is threaded into the gun body.

High pressures direct from the air line or lower pressures may be used in operating the dusting gun, which has an air consumption of 13 cubic feet at 80 pounds pressure. A new straight line design puts the nozzle practically in line with the air hose, thus permitting use

DeVilbiss Type DGA Air Dusting Gun

of the tool in close quarters without kinking or bending the hose.

The exterior parts of the DGA Gun are dull nickel plated, rounded to fit the hand comfortably. The air valve spring is cadmium plated to prevent rusting. Among the many operations in which this new gun can be used at an advantage are: evaporating solvents rapidly in cleaning operations, and final cleaning of faces before painting or finishing.

Magic Lacquer Spray and Solvent Hose

A lacquer spray and solvent hose which is said to be synthetic lined has been placed on the market by New York Belting & Packing Co., 1 Market St., Passaic, New Jersey. This type of hose is said to be particularly useful under conditions where elevated temperatures up to 150 degrees are encountered.

Because the tube is of synthetic stock, practically no swelling develops when it is used as a solvent hose.

In small sizes, this feature is said to be of great value as constriction of flow due to swelling is reduced to a minimum.

The inner tube of the Magic Lacquer Spray and Solvent Hose is made of a high grade synthetic rubber material and is said to resist the action of oils and commonly used paint solvents, in addition to lacquer solvents. It will not discolor delicate shades of paint. The body of the inner tube is made of braided reinforced plies of high grade cotton and has a smooth molded black cover of oil and abrasion resisting rubber stock.

Magic Lacquer Spray and Solvent Hose is available in sizes of ¼ in. to ¾ in., one and two braid.

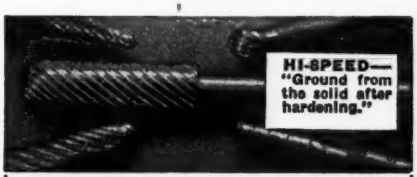
Subalox Paint

Subox, Inc., 370 River Rd., North Arlington, N. J., has recently placed on the market a lead oxide paint in which aluminum is used as a pigment, to be known as "Subalox". Three varieties of Subalox are available, namely the silver gray No. 510, gun-metal with a slight glimmer No. 508, and a mouse-gray with a very slight glimmer No. 511. The vehicle is applied by brush, or by spray after using thinner in proportion of ½ gallon to 1 gallon of paint. The drying time for Subalox is approximately 24 hours.

The paint can be used for interior or exterior work, as a rust-inhibitive metal primer in locations where corrosive agents are present.

Murray-Preston Spray Wheel

A spray wheel which is adaptable to air washers or other equipment having banks of spray nozzles, to be known as the "Murray-Preston" Spray Wheel, has been placed on the market by D. J. Murray Mfg. Co., Wausau, Wisconsin. It is suitable for high temperature cleaning or recovery because it is constructed of metals or alloys to meet specific chemical or corrosion conditions. The spray medium is an integral part of the entire unit. Delivery is made through a nozzle. It is stated by the manufacturer that the spray wheel used in connection with the nozzle cannot become clogged. The



SEVERANCE MIDGET MILLING CUTTERS
Large stock of Standard cutters. Any shape, any size—custom made for burring, countersinking, taper-reaming, tube burring and facing, ball socket reaming, trepanning, etc. Submit your problem to our engineers. **CATALOGUE ON REQUEST.**

Severance Tool Mfg. Co.
1516 E. Genesee Ave., Saginaw, Michigan

Murray-Preston Spray Wheel unit is self-cleaning and is said to furnish a uniform and steady spray. A direct connected splash-proof motor of the totally enclosed type is used in connection with the unit.

Ipco Mask

A mask which can be used in many trades for chemical operations requiring protection for the eyes and face from acid splashes and when pouring or dipping from open vessels, carboys, drums or pickling tanks, to be known as the "Ipco Mask", has been placed on the market by Industrial Products Company, 741 W. Somerset St., Philadelphia, Pennsylvania. The illustration herewith shows the design which offers protection to the eyes, face and neck.

Ipco Mask

The Ipco Mask is made of sheet aluminum, formed to shape and channelled to allow for a clear cellulose acetate window approximately 7 in. x 9 inches. The window is easily replaced without the use of tools. The headgear is of special black vulcanized fibre, is form fitting and adjustable to various head sizes.

An adjusting screw fitting of the headgear and the springs used in the hinge joints are of acid resisting stainless steel. A friction hinge joint permits the wearer to raise the mask over his head.

The Ipco Mask is light and comfortable, weighs approximately 14 ounces and may be worn with or without correction glasses.

U. S. Crepe Finish Conveyor Belt

United States Rubber Products, Inc., 1790 Broadway, New York, N. Y., has designed and placed on the market a belt of special cover design for conveying workpieces up or down an inclined plane. The belt was developed after careful study to determine the type of surface which would provide the greatest degree of efficiency for all incline service requirements. The U. S. Crepe Finish Conveyor Belt is said to have a surface of remarkable holding qualities. The belt provides the necessary roughness and is designed so that it can be easily cleaned.

U. S. Crepe Finish Conveyor Belt is furnished on 28 oz. and 32 oz. duck with special crepe finish cover on the carrying side. A minimum top cover thickness is 1-16 in. and may be increased as required. Additional back cover thickness can also be furnished to meet specific requirements.

Humidity Box

An inexpensive means of humidifying, to be known as "Humidity Box", has been recently placed on the market by Air Conditioning Supply Co., 1890 East 55th St., Cleveland, Ohio.

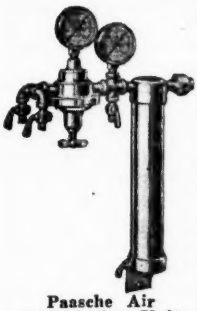
The Humidity Box developed over the past two years is essentially a high efficiency spray or fog chamber provided with suitable water filter and nozzle, air filter-eliminator or baffle, and drain fitting.

Where less than 30 lbs. per square inch water pressure is available, an electric vaporizer may be used to obtain atomization. The Humidity Box can be used with propeller fan type unit heaters or any warm air current whether in free air or in a duct. The Humidity Box is available with or without fans or blower units.

Paasche Air Conditioning Unit

Paasche Airbrush Company, 1910 Diversey Parkway, Chicago, Ill., has recently placed on the market the Air Conditioning Unit illustrated herewith.

A separator supplied in connection with the Air Conditioning Unit is said to be very efficient and can positively remove all water, oil, dirt and foreign matter from the air line.



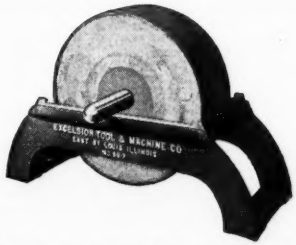
Paasche Air Conditioning Unit

The new type separator has no packing or parts requiring replacement. There is nothing to wear out, replace or adjust. There are no filters to insert.

In eliminating all water, oil, rust, carbon and scale collecting in the air line, a new type wire mesh arrangement is used instead of brass coils and no dirt, oil or foreign matter may pass through this unit and again into the air line. Double protection is provided by special air inlet slots in the outlet tube

Excelsior Polishing Wheel Balancing Stand No. 98

The balancing stand illustrated, product of Excelsior Tool & Machine Company, East St. Louis, Ill., is a sensitive and accurate device for balancing grinding or polishing wheels from the smallest size to 18-in. diameter or 7-in. width.



Excelsior Polishing Wheel Balancing Stand No. 98.

The ways upon which the arbor rests are hardened and accurately ground tool steel inserts, set into ¼x1 in. machined slots. This construction provides resistance to rough handling and wear and assures permanent alignment.

The stand is made in two sizes: for 5-in. wheel width with 5½-in. clearance and weighing 40 lbs., or for 7-in wheel width with 7¾-in. clearance and weighing 50 lbs. The total length is 28 in. and the height is 9 inches.

Odorless Oil Base Paint

An oil base paint which is said to be devoid of odor has recently been placed on the market by American Asphalt Paint Co., 33 E. Ohio St., Chicago, Illinois. The paint odor has been removed and the paint, while in the can, has a creamy consistency which the company calls Thixotropic. Active stirring results in thinning to brushing consistency. Evaporation can be replaced by thinners for use with this paint.

Setting of this Odorless Oil Base Paint takes place in 3 hours and drying in 12 to 15 hours. From 600 to 700 sq. ft. can be covered with one gallon on non-porous surfaces. The colors available include white, blue, green, gray, tan, cream and ivory. The paint is available in pint, quart, gallon and 5 gallon cans and in 35 gallon containers. The final finish obtained is flat, eggshell and gloss.

Maas and Waldstein Metal Finish for Rubber

Since it is often desired to give rubber parts or products a metallic finish that will harmonize with the metals with which they are used, the Maas and Waldstein Company, 438 Riverside Ave., Newark, N. J., has developed a special bronze lacquer for rubber. This special rubber lacquer makes it possible to cover semi-stiff rubber with a strongly adherent, durable finish resembling brass, copper, bronze, aluminum, steel, or other metals. This lacquer consists of a special bronzing liquid to which metal powder is added prior to use. The mixture is applied by spraying and is said to air-dry rapidly.

Bristol Pyrometer Controller

Close electrical control—free from chattering at the contact points—is said to be provided through Bristol's new Pyromaster Pyrometer Controller. This instrument is one of a new line of round-chart potentiometer pyrometers,

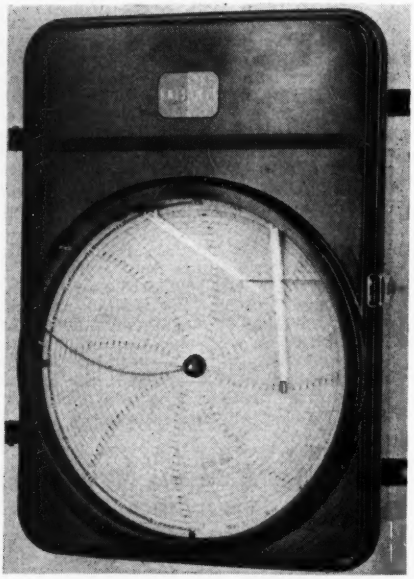
INDUSTRIAL OVEN — FOR SALE

Gehnrich Indirect Heat Oven

9'–10"–high outside 29'–11"–long inside
9'– 7"–high inside 9'– 7"–wide outside
30'– 4"–long outside 7'– 6"–wide inside

BUNTING GLIDER COMPANY

18th St. & Allegheny Ave. Philadelphia, Pa.



Bristol Pyrometer Controller.

manufactured by The Bristol Company, Waterbury, Conn.

Pyromaster Electric-Type Controllers are equipped with special "Unitact" relays, which require the making and breaking of only one contact, as the name implies, to effect control. They may also be built to operate with standard relays that require contacts for both making and breaking the controlled circuit. The new feature offered by "Unitact" control is in providing for quicker response to changes in the controlled temperature and in eliminating insecure contact at the control points.

It is the new operating principle of Bristol's Pyromaster that makes "Unitact" control possible. Instead of continuously moving parts and trains of gears to be engaged and released as with ordinary potentiometers, a series of relay-actuated switches, with a special wiring arrangement, is used to position the pen arm on the instrument chart and to effect control. The same types of control are obtained with the Pyromaster "Unitact" Controller as with standard relays, that is, High, Low, High-Low, High-Off-Low, and High-Normal-Low.

Bristol's Pyromaster instruments—the recorders, controllers and indicators—are compact in construction, being built in standard 12-inch cases; they are rugged and not effected by plant vibration; they have no con'inuously moving parts; they require no lubrication.

Rubalt SP-4

Alfred Hague & Co., 225 34th St., Brooklyn, N. Y., has recently placed on the market a rubber-base paint that can be applied on a rough or smooth surface to be known as "Rubalt SP-4." This material is said to produce a hard surface finish that can be sanded smooth.

Rubalt SP-4 fills irregularities on composition materials and concrete. It can also be applied on castings.

When Rubalt SP-4 is used in connection with Hague No. 320 Enamel for air drying or No. 266 for baking, a finish is produced similar in appearance to that of vitreous glazing. This surface has chemical resistance to acids and cleaning compounds and is also said to be waterproof.

The final finish obtained with Rubalt SP-4 is hard but will not shatter and it can be waxed. Experiments have shown that repeated washings with trisodium phosphate will not reduce the gloss.

M. S. A. Air Line Respirator

Complete protection against paint spray vapors and pigments is said to be provided by the new M.S.A. Respirator which was recently placed on the market

M.S.A. Air Line Respirator.

by the Mine Safety Appliances Company, Braddock, Thomas & Meade Sts., Pittsburgh, Pennsylvania.

The new respirator is light and comfortable and permits the wearer to remain entirely independent of the working atmosphere, assuring him of a positive protection from respiratory hazards.

The half mask type face-piece of the M.S.A. Air Line Respirator is all rubber, easily adjusted and fits any face with a gas-tight seal. Incoming air is ingeniously deflected from directly striking the face and the exhalation valve meets the U. S. Government specifications. A corrugated, non-collapsible all rubber connecting tube extends from the face-piece to a flow control valve at the belt. The connecting tube is flexible, durable, and permits free head movement. A "bump-proof" handle and quick-release connection on the flow control valve provides an added guarantee of safety.

Stephen-Adamson Conveyor Carrier

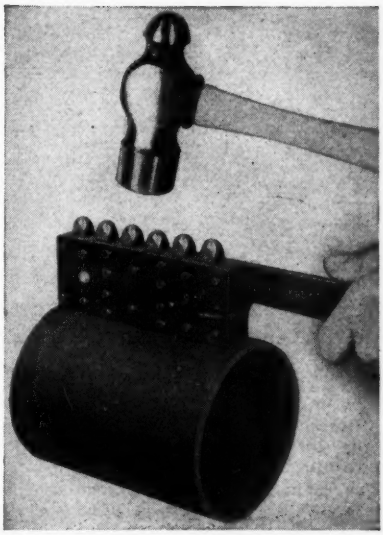
A light weight, ball bearing carrier which is supported on a frame of two parallel 2 in. pipes has been brought out by the Stephen-Adamson Mfg. Co., Aurora, Illinois. Carrier brackets are clamped to the pipes without boring holes and the carrier can be shifted when necessary.

Rocker type mounting permits the carrier to tilt in any direction with the travel of the belt. The conveyor carrier employs a three-roll design in which the two outer rolls are inclined in order to trough a belt at 20 degrees. The rolls turn on cartridge-type ball bearings, lubricated and sealed at the factory. There are two styles available, one consisting of carrier only and the other including carrier and return roller.

Cunningham Safety Tube Stamp Holder

M. E. Cunningham Co., 177 E. Main St., Pittsburgh, Pa., has recently placed on the market a Safety Tube Stamp Holder which is designed to hold safety steel stamps securely during the marking of objects. The tube holder is designed to promote safety in production and to eliminate hap-hazard stamping on tubing and curved objects where both single and multiple characters are desired.

The Safety Tube Stamp Holder can be made for a single stamp or any quantity of stamps where straight line



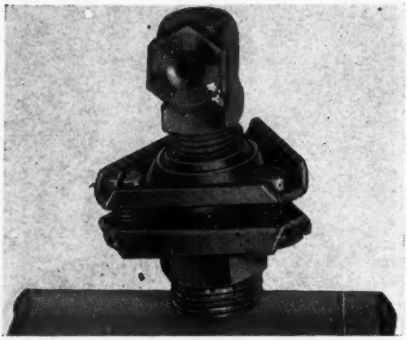
Cunningham Safety Tube Stamp Holder

stamping is desired. If the surface to be stamped is flat, it is also possible to have a holder made for two lines, one of which might be for a trade mark on the top line and a series of stamps on the second line to designate dating, inspection or any other necessary information.

An extended handle assures a firm grip on the holder and added protection where a heavy hammer is used by the operator or his helper. The stamps are held in the holder by means of a simplified pin which extends through a pocket and is held in place by a spring fit. The stamps are slotted so the pin will hold the stamp in place when raised from the object being marked. Each stamp can be easily struck with a hammer with no spalling or mushrooming. The holder made for tube stamping is notched at the bottom so as to assure a firm seat on the tube.

Adjustable Joint for Mounting Spray Nozzles

An adjustable joint for mounting spray nozzles in metal-cleaning processing has been placed on the market by Spraying Systems Co., 4922 W. Grand Ave., Chicago, Illinois. The standard adjustable joint is made of brass but it



Adjustable Joint for Mounting Spray Nozzles

can be had in any other material required to meet chemical and corrosion conditions.

The adjustable joint is available in the following pipe connections: ¼ in. x ⅛ in., ⅜ in. x ¼ in., ⅜ in. x ⅜ in. and ½ in. x ⅜ in.

Multi-Seal Front Drive Pipe Connector

The Multi-Seal Manufacturing Corp., 123 N. Jefferson St., Chicago, Ill., has recently placed on the market a Multi-Seal Front Drive Pipe Connector for use in attaching pipes to containers without having to get on the inside. The Multi-Seal Connector is said to make it unnecessary to shut down a plant for draining and flushing tanks and also eliminates the use of man holes, boiler flanges, or the necessity of welding, tapping, and riveting.

The Multi-Seal Pipe Connector is available as a single unit and may be used on steam, gas, oil, water and air and will withstand high pressures. The Multi-Seal unit is of all-steel construction.

Multi-Seal Front Drive Pipe Connector

Tapping into high pressure containers without draining or shutting down of power is accomplished by attaching a shut off valve at the pipe end of the connector with a length of pipe in the valve to act as a handle to push the connector against the pressure. After the installation is completed, the length of pipe can be disconnected and the line attached, the valve can then be opened.

Clark E-Z Roll Platform Truck

All Steel Welded Truck Corporation, Rockford, Ill., has recently placed on the market the Clark E-Z Roll Platform Truck. The Clark E-Z Roll Platform Truck is available in a wide range of standard sizes and can also be obtained in special sizes to meet individual requirements of the customer.

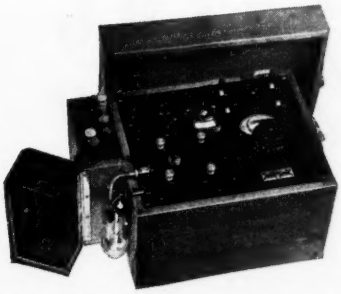
The Clark E-Z Roll Platform Truck is of electric welded construction throughout, with one piece angle frame around a deck of 5/4 selected hard maple. The wheels are available of semi-steel or Goodrich rubber tired wheels with Hyatt roller type bearings and zerk fittings. Clark double row ball bearing swivel casters are also provided.

Clark E-Z Roll Platform Truck

Leeds & Northrup Portable Universal pH Indicator

Leeds & Northrup Company, 4934 Stenton Ave., Philadelphia, Pa., has recently placed on the market a Portable Universal pH Indicator for laboratory and plant. This versatile instrument is said to read directly in pH with glass, quinhydrone, hydrogen or any other electrode following the Nernst equation. When used with the glass electrode system which is furnished, a simple setting of the dial of the temperature compensator

adapts the entire pH scale to measurements at that temperature. This applies also if a quinhydrone electrode is substituted for the glass electrode. The



Leeds & Northrup Portable Universal pH Indicator.

Portable Universal pH Indicator is equipped with a voltage scale as well as a pH scale and it can also be used with oxidation-reduction potential measurements, and in current and resistance determinations. It can be used with external circuits of much higher resistance than the 100 to 300 megohms of the glass electrode with which it is supplied.

The newly designed glass electrode is small, comparatively rugged, and requires only 5 ml. sample for measurement. Everything necessary for glass electrode measurements is included with the instruments.

Additional features of the Portable Universal pH Indicator are quartz insulation, where necessary, to avoid leakage errors, and a separate battery compartment to prevent corrosion. This pH instrument is designed to operate at full sensitivity and accuracy.

Goldglo

A newly developed imitation gold plate, to be known as "Goldglo", has been placed on the market by Special Chemicals Corp., Dept. F, 32 Irving Place, New York, New York. Goldglo was developed to meet the need for a low cost finish that has the appeal of the rich beauty of gold and according to the manufacturer, is a very close approach to an actual gold plate.

Goldglo is said to have extremely high throwing power and to penetrate to remote recesses. Due to this feature of high throwing power, racking problems are simplified, increase in the speed of plating is obtained, and basket plating is possible.

Goldglo plates directly over brass, copper, nickel, german silver, iron and steel. It is also said to plate over all hard solders and a majority of soft solders. A coating of lacquer over a coating of Goldglo is said to insure permanency of the finish.

Synthane Glass Fabric Bakelite-Laminated

Synthane Corporation, Oaks, Pa., has recently placed on the market a new Bakelite-laminated material in which a woven glass fabric is used. Tests have shown that glass gives a low moisture absorption that has not been duplicated previously in laminated phenolic resinoid materials. Synthane Glass Fabric Bakelite-Laminated material is said to provide a minimum change in electrical characteristics, and a high resistance to the action of corrosive liquids.

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for your CATALOG *library*

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. **Heat Exchangers**

   An 8-page bulletin describing Duriron as used in the construction of corrosion-resistant equipment to handle low pH plating solutions. Duriron is chemically inert to all plating solutions. The Duriron Company, 450 N. Findlay St., Dayton, Ohio.

2. **Crystal Finishes**

   Bulletin No. 8 describes in full detail Hilo Crystal Finishes in pastels, colors, black and clear. Color samples are included. Hilo Varnish Corporation. 42-60 Stewart Ave., Brooklyn, N. Y.

3. **Abrasive Bond**

   An 8-page folder describing Nuglu for setting up polishing wheels and belts. J. J. Siefen Company, 1936 W. Lafayette Blvd., Detroit, Mich.

4. **Spray Booths and Ovens**

   Newcomb-David Company, Inc., 5741 Russell St., Detroit, Mich., has issued a 24-page catalog illustrating and describing typical N-D Spray Booths, Industrial Ovens, Metal Parts Washers and Ventilating Equipment. See Page 19.

5. **Canopy Localites**

   This catalog describes lighting units from small canopies of only 20 in. length up to models 36 in. wide in continuous runs of any length. There are units for bench and table mounting, models for overhead suspension, a new deluxe desk model, and a portable unit on a 50 in. upright. The Fostoria Pressed Steel Corporation, Fostoria, Ohio.

6. **Plating Barrel**

   The Udylite Plating Barrel is completely detailed in a bulletin published by the Udylite Company, 1651 E. Grand Blvd., Detroit, Mich.

7. **Metal Grinding and Polishing Wheels**

   A 30-day free trial offer of Weka Grinding and Polishing Wheels is described in this folder. Weigert & Spector, 35 Wooster St., New York, N. Y.

8. **Black Finish To Steel**

   A 4-page bulletin outlining the Pentrate Process of applying an attractive, low-cost black finish to steel, through a process of chemical action. Heatbath Corporation, Springfield, Mass. See Page 15.

9. **Industrial Ovens**

   Two new bulletins giving full particulars on air heaters and industrial ovens. J. O. Ross Engineering Corporation, 350 Madison Ave., New York, N. Y.

10. Portable pH Meters
Bulletin M-361A describing Thwing-Albert Instrument Portable pH Meters which are built to fill the everyday practical requirements in laboratories and industrial plants. Thwing-Albert Instrument Company, 3339 Lancaster Ave., Philadelphia, Pa.

11. Analysis of Plating Solutions
A 24-page booklet containing methods of analyzing plating solutions in practical operations has been issued by Hanson-Van Winkle-Munning Co., Matawan, N. J.

12. Handling Systems
Two suggestions are covered in this catalog. They are as follows: Plan the Size of the Load to Meet the Requirements of the Problem and Increase the Size of the Unit Loads Through Production. The Cleveland Crane & Engineering Co., Wickliffe, Ohio.

13. Dust Collecting Systems
An attractive 24-page catalog has just been issued by The Kirk & Blum Mfg. Co., 2816 Spring Grove Ave., Cincinnati, Ohio, which illustrates and describes many K & B Dust collecting Applications installed in numerous industries. See Second Cover.

14. Procedure Chart for Plating Rolled Zinc and Zinc Alloy Die Castings
A practical and useful chart for quick reference by the plater applying only to nickel plating thicknesses suitable for mild indoor use. The New Jersey Zinc Company, 160 Front St., New York, N. Y.

15. Bulletin Boards
This folder describes Bulletin Boards especially designed for safety and general bulletins in the finishing department. Mine Safety Appliances Company, Braddock, Thomas & Meade Sts., Pittsburgh, Pa.

16. Automatic Polishing Machines
The Packer Machine Co., Meriden, Conn., has issued a catalog illustrating and describing the Packer line of automatic polishing and buffing machines.

17. Cleaning and Electroplating Zinc Alloy Die Castings
An announcement of the practices found best in the cleaning and plating of die cast metals. Oakite Products, Inc., 20 Thames St., New York, N. Y.

18. Burnishing Barrels
Complete details on the Abbott burnishing barrels and burnishing materials are contained in a folder brought out by Abbott Ball Company, 1061 New Britain Ave., Hartford, Conn.

19. Industrial Masks and Canisters
Describing the M.S.A. Industrial Masks and Canisters in complete detail is a strikingly colored and well illustrated brochure just off the press. Mine Safety Appliances Company, Braddock, Thomas & Meade Sts., Pittsbugh, Pa.

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